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Considerations on the Statics of the Pelvic Viscera and their Relationship to the Operative Treatment of Utero-Vaginal Prolapse *

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Part II.

Pathological and Therapeutical Considerations.

From the preceding anatomical considerations, it naturally follows that whatever on one hand will increase the intra-abdominal pressure, the weight of the uterus itself or of any organ connected with it, and on the other, whatever will lead to relaxation, absorption or destruction of the different pelvic planes, must necessarily favour also displacement descent and finally hernia of the pelvic contents. Further, the close relationship of the supporting elements of the pelvic viscera to one another, and to the pelvic organs themselves, explains the intimate connection of one form of displacement with another, which thus requires no further demonstration. Each variety may, of course, temporarily exist as a separate entity, justifying a special description or treatment, nevertheless, for practical purposes, the displacement of one organ should always be regarded only as preceding that of the others and treated accordingly.

The principles governing the successful treatment of pelvic herniæ may, therefore, be said to centre themselves around the reduction on one hand of the force acting from above and on the other, the reinforcement from below, or from above as the case may be, of the structures forming the pelvic floor. Unfortunately, the practical application of these principles presents features of unusual complexity; first, owing to the impossibility of checking with any degree of certainty the intra-abdominal pressure; secondly, because of the difficulty of reconstructing in anything like a "restitutio ad

* Read at the S. A. Medical Congress, 1909.

integrum" the structures supporting the pelvic viscera; thirdly and finally, owing to the fact only too easily set aside by innovators of new surgical procedures, that the normal uterus, as indeed all the other organs resting on the pelvic floor, are essentially movable organs and therefore liable, if interfered with by pathological processes, or operative measures, to have their mobility compromised and their functions greatly hampered if not destroyed.

To the first dilemma the only solution is one so far removed from the area of practical therapeutics as to be unfortunately a negligible quantity. We may, with some hope of betterment, especially in the more recently acquired forms of displacements, advise the restriction of violent movements, the recumbent posture, the removal of all restricting bands, such as corsets, tight-fitting dresses, or the wearing of abdominal supports, but no one can look upon these measures, even if given extensive trial, as but adjuncts to a treatment, which to be of any value, has perforce to be more active and positive at the same time. Surgery fails, therefore, to check the action of a force, which if an unknown, is only too tangible a quantity.

Can it do more to solve the second problem?

Let us recognize at once, that no operation ever devised or performed has as yet been able to reconstruct what is certainly a very complex anatomical arrangement, and what, if once destroyed, is unquestionably beyond complete repair. Surgery can only patch up, but the patching up, if done judiciously, and specially on an anatomical basis is of material assistance. It certainly considerably relieves, if it does not always cure, and on its proper conception and application may be said to rest the foundation of the successful treatment of prolapse.

The third problem is perhaps one that has exercised the minds of surgeons more than any other connected with the surgery of the pelvic cavity. It is responsible for an abundance of procedures, the ingenuity of which could not be but admired, if unfortunately the great majority were not stamped by that irrational application of the best known principles of physiology which makes them valueless if not dangerous. How to hold the uterus in position, without interfering with its mobility is still the question, which for many goes a begging, although the study of the action of the round ligaments in the statics of the uterine body and the now extensive experience derived from hundreds of operations, should have, by this time, given us some reliable answer.

We shall see presently that there is such an answer, provided we do not ask for the unobtainable, and understand that if the preservation of the physiological posture and mobility of the organ of conception of the woman, still in the child-bearing period, is the goal to be striven for and to be attained at all reasonable costs, there are

occasions when between two evils, it is wise to choose the lesser and sacrifice without fear what often has become an encumbrance and only requires to be kept out of harm's way to prevent further mischief.

To this end and in view of the special treatment demanded by each variety, we may divide uterine misplacements into the usual classical divisions of retro-deviations and prolapses, to which must be added the condition of hernia of the pelvic organs by which we imply here, the complete extrusion outside the vulvar aperture of the uro-genital canals.

Uterine Retro-deviations.

Backward displacement of the uterus has been further subdivided into retroflexions and retroversions.

The former term implies a relaxation of the round and of the strictly peritoneal border of the broad ligaments, the meso-salpinx, but above all the condition is due to the abnormal flexibility of the uterine body at its cervico-corporeal junction.

The pathological changes which thus upset the equilibrium of the fundus are numerous and need not be mentioned here, the terms congestion and inflammation cover practically the majority of the morbid changes affecting the mucous surface and the uterine parenchyma leading to this undue softening of the uterine body and its maintenance in Douglas's pouch by the intra-abdominal pressure.

By retroversion we mean the addition to the above changes of an excess of mobility of the cervical portion of the uterus, which thus gets tilted forward, while the fundus sinks backward.

Retroflexions and retroversions are often combined.

In my experience, except in some nulliparæ where it may be a congenital defect in the growth of the uterine walls, a pure retroflexion is a rare condition, and in the vast majority of cases is probably only the first step to a retroversion, which thus adds to the relaxation of the round ligaments and the undue softening of the uterine walls, a slackness of the perivascular sheaths holding the cervix in position.

A retroversion is therefore frequently associated with an early descent of the uterine body, and from a practical point of view should be considered as a condition of mild "descensus uteri" paving the way to prolapse. The sagging of the uterine sling, does not, of course, necessarily mean also the relaxation of the fibro-muscular layers of the pelvic diaphragm, and the bladder may still be held in position by its pubo-vesical ligaments, while the utero-pelvic and utero-sacral have already given way. Thus a retroversion may exist without an apparent cystocele and colpocele. A careful examination, however, will almost always detect some degree of descent of the whole uterine plane, which may be demonstrated by a shallowness of the vaginal fornices and the unusually roomy condition of

the upper vaginal segment. What has given way here is the upper fibrous and connective tissue layer, and with it also the perivascular sheaths, either owing to injuries received through parturition or abortion, or simply owing to degenerative changes or a diathetic condition, which has led to absorption of some cellular elements, but mostly of the fatty cells of the loose connective tissue. It is not surprising, therefore, that retroversions should be found in nulliparæ or that virgins, with no excuse of a past history of labour or abortions, should present a slight descent of the uterus, while they still have a vaginal introitus guarded by an intact hymen and a perfect action of the levator ani muscle. We remember seeing a young girl, who, while playing tennis, had her uterus forcibly shot out, so to speak, from the pelvic cavity. She was a red-haired, anæmic, overgrown young woman, who, after a serious attack of typhoid fever, had lost a considerable amount of fatty tissue. Her internal pelvic suspensory apparatus was unquestionably as relaxed as her anterior abdominal wall, which was slightly pendulous and remarkably flabby. Under the violent action of the intra-abdominal pressure, brought about by exercise, the uterus with its overstretched perivascular sheaths, easily overcame her weak and unprepared levator ani, reaching at one bound a position which the wombs of other women only attain after months if not years of gradual descent.

Surgical Treatment of Retro-deviations.

The surgical treatment of retroflexions and retroversions when necessary, which is by no means always the case, as many patients show no symptoms and therefore require no treatment, depends much on whether the condition is a temporary or permanent one, and also upon the nature and the severity of the symptoms created.

In the former case an intra-uterine treatment may be all that is required. If, in addition to a thorough curettage and to the other means usually employed to relieve the passive congestion and inflammatory conditions of the uterine mucosa and parenchyma, the uterus is straightened by an intra-uterine stem and the maintenance of the anteverted position further assisted by a well-fitting Hodge pessary or a still more active support, by a well-directed and applied "tamponade," the cure, although somewhat tedious, may be permanent.

What is wanted here is to give time to the uterine supports to recover their temporary lost elasticity and reduce at the same time the enlarged and heavy uterine body, so frequently the sequela of post abortum and post partum conditions.

In obstinate retro-deviations the surgical treatment obviously demands more radical measures, and depends much on whether the uterus is free in Douglas's pouch and can still be replaced by manual or instrumental manipulation, or whether the condition has

been followed by acute inflammation of the pelvic peritoneum leading to the formation of adhesions which may have permanently bound down the organ in its false position. The first condition has been described as a simple or mobile retro-deviation, the second on the contrary as a complicated or adherent retro-deviation. Mobile retro-deviations, whether versions or flexions, only here deserve consideration, as the adherent ones may safely be left to the surgical treatment of tubal and ovarian inflammatory diseases of which they are in reality one of the most constant complications.

When a uterus is permanently retroflexed or retroverted, but still mobile, it may be asserted that it cannot be restored to a position of anteversion and maintained in that situation, unless some means are found of altering its overstretched ligamentary connections of which the most important ones are the round and the utero-sacral ligaments. In other words we must find some practical way by which the tow strings which are supposed to poise the fundus across its mesometrium can be shortened and made taut again, while an attempt is made to take up the slack of the perivascular sheaths holding the cervix in a latero-posterior direction, so as to preserve the normal anteflexion of the uterus and prevent as well its downward tendency.

Shortening of the so-called round and utero-sacral ligaments are unquestionably here, the operations which in the treatment of uterine retro-deviations are based on the soundest physiological principles, and especially as regards the first structures have proved the more reliable and successful.

Shortening of the Round Ligaments.

Alexander's and the intra-peritoneal shortenings of the round ligaments are the operations usually and most frequently performed In spite of undue criticism, followed by a still more unjustifiable generalization in its application, Alexander's operation has stood the test of time and experience, and when applied to a small, easily-replaced uterus, with a sound condition of either tubes and ovaries, gives excellent results. It is the procedure to advise for a simple uncomplicated retroflexion, but may also be applied to some forms of retroversion with only a slight relaxation of the utero-sacral ligaments.

Unfortunately, the impossibility of ascertaining whether the uterine appendages are perfectly healthy, the fact that the operation is not always of easy performance, that the uterus is frequently enlarged and heavy, and the round ligaments possibly illdefined and in an atrophic condition at their inguinal insertion, may render its substitution by the intra-peritoneal method necessary.

Of all the innumerable and varied surgical procedures devised by countless surgeons to secure by this means, the correct altitude, while maintaining at the same time the mobility of the uterus, one of the

best is doubtless that described and performed by Gilliam of Columbus, U.S.A., and which has since been modified and greatly improved by Simpson.

The principles underlying Gilliam's operation are exactly those governing Alexander's, with this difference that the abdomen is opened and a loop of the round ligament at its strongest and most developed portion secured on the aponeurotic sheath of both recti muscles, thus obtaining a firm fibro-muscular attachment to the undivided ligaments. The operation is simplicity itself and really meets all requirements, as it gives to the retroposed uterus a firm support, while it grants to it at the same time all the flexibility and mobility it formerly enjoyed. Unlike Alexander's operation, which corrects the uterine deviation without being absolutely certain of the condition of the uterus, or of the actual state of its appendages, it gives full opportunity to deal with adhesions, or any abnormalities of the tubes or ovaries so frequently following uterine misplacements, and which if left untreated would finally destroy any benefit conferred to the patient by the operation. Unfortunately, as pointed out by Kelly[8] Gilliam's intra-abdominal fixation of the round ligaments "divides the pelvic cavity into three segments (one external to each round ligament and one between the ligaments), any of which may serve as a pocket in which the bowel may become incarcerated." This has happened once in the experience of Simpson, and I am sorry to say within the last 24 months of mine also, when a former patient, to whom I had suspended the uterus by Gilliam's method, was suddenly seized with violent intra-abdominal pains and died three days afterwards of peritonitis, a somewhat tardy abdominal section performed with all the disabilities attending such procedures in outlandish places having failed, I am told, to relieve the obstruction favoured by the pocket diverticula resulting from the first operation.

Simpson's retro-peritoneal shortening of the round ligaments obviates the possibility of a recurrence of this unfortunate accident. The technic advised by that surgeon consists in making a loop of the round ligament at its outer third and suturing it to the uterine cornua, opening the peritoneum on the anterior surface of the broad ligament and withdrawing the loop through this opening by means of a Deschamp's needle which has been passed between the rectus muscle and the aponeurosis of the transverse muscles to the internal ring and then along the round ligament to the opening in the peritoneum. The loop of round ligament is then sutured to the aponeurosis exactly as in Gilliam's operation.

As it will readily appear this operation presents all the advantages of an Alexander without its disadvantages. It does not weaken the inguinal rings, allows full inspection of the abdominal cavity, and by using the middle portion of the round ligament, and its strong

uterine end, renders the fixation firm and durable. It is indeed the ideal procedure to shorten the round ligaments, one of its most favourable points being that it does so without disturbing the natural relation of the uterus to the rest of the pelvic organs, and especially as regards the action of the bladder.

As I have already had occasion to point out elsewhere[9] the large majority of uterine suspensions and fixations materially interferes at times with the proper distension of the bladder and its ascent in the pelvis, and although, as truly pointed out by H. A. Kelly transient irritability of the bladder is occasionally observed after all sorts of abdominal operations, nevertheless it is of such frequent occurrence after uterine fixations, that unless one subscribes to the rather doubtful statement made by some authorities, that it is always due to cystitis and defective catheterisation, it seems within reason to admit that the symptom may arise from an inability on the part of that viscus to accommodate itself to its new position; hence the advisability to choose, if possible, an operation which interferes with its functions as little as possible.

From the experience I have gained in, as yet a few cases, I must admit Simpson's retro-peritoneal shortening of the round ligaments, following as it does the same arrangement devised by a wise nature to allow sufficient space for the vesical expansion, fully meets the case and does so without impairing in the least, either the solidity of the suspension or the mobility of the uterus.

Descensus Uteri.

Alexandroff-Tweedy and Donald Operations—Shortening of the Utero-Sacral Ligaments.

Uterine retro-deviations being always attended with some degree of descent of part or of the whole of the upper pelvic segment, and bearing in mind what has been said as to the non-supporting action of the round ligament, it naturally follows, that when the uterus is enlarged and heavy, and the perivascular sheaths overstretched, something more than a mere suspension may become necessary.

Such cases, where the upper part of the vagina and with it the parametric tissues on its sides and on the latero-posterior aspect of the cervix have become relaxed, should be carefully distinguished from those of the prolapse. The term "descensus uteri," or partial prolapse, exactly defines this variety of uterine displacement, inasmuch as it only implies a giving way of the upper pelvic segment and not of the lower, and therefore only affects the uterus and upper part of the vagina and not the rest of the utero-vaginal canal.

This condition, as we have seen, is generally associated with backward displacement, but it also exists without a retroflexion or retroversion, should the uterine parenchyma show some rigidity and the round ligaments be still acting. A large number of women suffer

from this sagging of their upper uterine segment. Indeed, it seems probable that many conditions ascribed to infective causes of either the uterine mucosa and its adjoining parenchyma or its appendages, are simply due to the congestion, favoured and maintained by this partial descent of the uterus. These are just the cases where a well-fitting Hodge or ring pessary, when the pelvic floor is still sound, gives so marked a relief, but one also where operative treatment, when mechanical aids have ceased to be of use, is of difficult application, and frequently utterly fails to obtain permanent results. Why do so many women after a successful operation of suspension, and in spite of the correction of the retroversion, still suffer from backache and on the whole are not much benefited by surgical treatment?

The reasons given are too numerous to mention or discuss, but one of the more plausible ones is that the organ, although anteverted, has not regained its normal plane in the pelvic cavity—it still sags, consequently it is still congested and painful. What is wanted here is, to use Dr. Fothergill's expressive terminology, "to take up the slack in some degree," and he goes on to mention Alexandoff's operation and those performed by Tweedy and Donald, of Manchester, as being successful in obtaining this aim.

According to the same author, however, "there are obvious technical difficulties in handling a mass of tissue, which contains embedded in it, important arteries, veins, and lymphatics, as well as the ureters, and which is attached to the whole surface of the vagina, a large portion of the bladder, and to the anterior aspect of the cervix uteri." So there is! and indeed one is not surprised to hear that "the most surgery can accomplish in this direction is to alter the attachment of the more accessible portions of this mass of tissue to the cervix and upper part of the vagina in such a way as to "take up" the slackness of the overstretched perivascular sheath." How the slack can be taken up, Dr. Fothergill describes further,* but except in such cases where the uterus is removed as well, a procedure somewhat too radical for ordinary cases of prolapse, the description of this operation is unfortunately as illdefined as the tissues to which it is applied.

Nor is one surprised to find, as an adjunct to this taking up the slack, that the performance of the time-honoured operations of ventro-fixation and colpo-perineorrhaphy should be advised, as apparently of a more lasting character.

Whatever future such procedures may have as adjuncts to colpo-perineorrhaphies to which we will refer later, they have always appeared to us, so far as the uterus itself is concerned, to lack the precision and the "raison d'être" demanded by sound surgery.

* Fothergill, *Loc. Cit. Operations for Prolapse*, page 413. *Journal of Obstetrics and Gynæcology of British Empire.*

What do they aim at and how is the slackness of the overstretched perivascular sheath taken up? The blind insertion of temporary ligatures about an inch and a half from the cervix on either side, their junction in the middle line (Tweedy), and the further union "in front of the cervix of a *good deal* of the parametric tissue and a *good deal* of the paravaginal tissue of both sides, without endangering the ureters or the blood supply of the parts" (Fothergill) appears a matter of considerable speculation if not impossibility! The extensive anterior colporrhaphy, performed at the same time, certainly does relieve the slack in a measure, but such an operation affects the vesical plane only and not the uterine, and should it do so, which our practical experience has not borne out, the suturing of the parametritic and paravaginal tissues one to another and to the anterior aspect of the cervix *owing to the very nature of the tissues operated upon* can only be temporary and lacks all the elements of stability.

Freund, in 1889, to remedy the "descensus uteri," especially when complicated by retro-deviation, shortened the utero-sacral ligaments per vaginam, and suggested it also per abdomen. The operation is now performed either way, and as pointed out by Kelly, combined with plastic operations, shortening the round ligaments, or suspensio uteri it should be followed by a mechanical cure of the retro-displacement and prolapse of the uterus. Our experience, which we may state at once, has been limited to a dozen or so of cases, is very similar to the one Kelly quotes as given by Polk. The operation per vaginam is difficult and hazardous, at times impossible, per abdomen, if much easier, it has one great objection, which is to necessitate a large abdominal incision. One certainly, to quote Kelly again, "which the uniformly satisfactory results secured by other methods" has been proved unwarranted, especially when it may be remembered that the therapeutical results obtained have been either doubtful or have not been permanent.

VENTRO-FIXATION.

Under these circumstances, and seeing that neither shortening of the round ligaments, nor plastic operations which only affect the lower pelvic plane, can be trusted successfully to raise the uterus to its normal position, especially when large and heavy, one may well turn to the other surgical methods as probably presenting more effective and permanent support to the relaxed pelvic organs. Of these none has been more widely performed and on the whole has met with more success, in spite of its obvious drawbacks, than Lawson Tait's original operation of ventro-fixation. It is not only a valuable surgical measure in retro-deviations, but may also be indicated in some forms of prolapsus uteri with or without plastic operations on the vagina. Now we fully agree with those who consider it an unphysiological venture, and in young women a dangerous one into

the bargain. Indeed, it has always appeared to us that to fix to the abdominal wall the fundus of a woman still in the child-bearing period is to interfere fundamentally with the plans of nature, which has made the organ naturally free and mobile, so as to meet the different changes of altitude and size necessitated by the menstrual and puerperal states.

We therefore fully endorse the opinions of those surgeons who, like McKay[10] declare that it should now be an accepted surgical axiom that ventro-fixation ought never to be performed on any woman who is likely to become pregnant. Nor can we but agree with him when he strongly denounces the teaching of those authorities who, like Herman[11] and Giles,[12] take the attitude that when "the operation is properly performed subsequent difficulty in labour need not be feared." Kelly has well shown how ill-founded such an opinion is, nor is the recitation of the disasters which have followed this nefarious practice of any moment, as they are too well known to require recapitulation. But if ventro-fixation is contra-indicated in women still liable to impregnation, it is on the contrary *the operation* par excellence which belongs to the period of the menopause.

All that is wanted here, is to produce artificially a strong adhesive ligament which will hold permanently in position an organ probably materially enlarged and which only requires to be kept out of harm's way to prevent further degeneration. This ventro-fixation fulfils to perfection and is our most reliable and trustworthy operation. It not only keeps the uterine body well forward and in an anteverted position, but it successfully raises as well the whole uterine and visceral planes, a result unobtained by any other fixation or suspension operation.* Whatever may be said to the contrary, therefore,

* A little known, or at least not a frequently mentioned result of round ligament fixation, is, its temporary existence.

On four occasions, I have had to re-open the abdomen of patients, on whom several months to three years previously, I had shortened the round ligaments by Alexander's and by a method very similar to Gilliam's. In every case, the uterus altrough anteverted, was no more held in situ by the shortened round ligaments—these had become elongated, in fact had again partly resumed the sinuous appearance they have in health. I experimentally retroverted the uterus but by doing so, did not put them to the stretch and on releasing my hold, the artifically retroplaced uterus, resumed its normal position, certainly not owing to any action of the round ligaments, but simply on account of the now tonically recovered elasticity of the uterine parenchyma and more specially of its subjacent fibro-muscular and cellular elements. This temporary nature of round ligament fixation shows the utter futility of depending on this operation to hold up permanently a badly retroverted and partially prolapsed uterus, but it becomes an advantage of no mean order, when on the contrary the retroversion is unattended with any marked elongation or sagging of the peri-vascular sheaths and of the fibro-muscular and cellular elements composing the pelvic diaphragms. The operation be it round, broad, or retro-uterine fixation of either broad or round ligaments, has fulfilled its purpose as soon as tone is restored to the temporary relaxed uterine supports and the more rapid the vestiges of surgical interference are effaced the better.

ventro-fixation will remain the sheet anchor for the gynæcological surgeon, whenever he has to deal with those conditions of uterine displacements where the fundamental lesion consists in the permanent overstretching, whether by actual destruction or by absorption, of the elements supporting the uterus and its adjoining viscera. Should it become imperative to perform it on a young woman, an eventuality which the correct application of other methods should render more and more unlikely, it should be the surgeon's greatest care never to include the fundus in the fixing sutures, but to apply the latter close to the cervico-corporeal juncture, and on the anterior uterine surface, so as to facilitate the upward ascent of the organ during pregnancy.

PROLAPSE.

Relaxation of both the upper and lower pelvic planes gives rise to the condition known as "prolapsus uteri." The uterus is then generally found lying immediately behind the vulvar aperture surrounded by the redundant folds of an inverted vagina. But the prolapse may only affect the vesical plane, or the vaginal walls, when it gives rise to what is described as cystocele, or colpocele.

Although the descent of the uterine body may be the primary lesion which ultimately leads to that of the other visceral organs, in the great majority of cases the destruction of the lower pelvic plane, and in particular of the levator ani muscle and its fascial covering, is the initial injury which practically always favours this form of displacement. The surgical treatment of prolapse may therefore be said to centre itself almost exclusively around the reconstruction, in as complete a manner as possible, of the lower pelvic fibro-muscular diaphragm. Of the various and complicated methods invented to deal with this condition, perhaps the simplest and certainly one of the best is that of Hegar, one of the earliest pioneers of perineal operations

When applied to a relaxed vagina, with no material damage to the "pelvic floor," its results are excellent and sufficient in the milder cases of prolapse to restore the parts to a normal condition. In the majority of procidentia cases, however, the injuries to the perineum involve a laceration of the muscles of the sacral segment of the pelvic floor, together with that of the deeper layer of the pelvic fasciæ. Such an operation, which only resects the superfluous and redundant parts of the vaginal canal is utterly inefficient to deal with the situation, and it becomes necessary to do more to restore some strength to the damaged pelvic floor. We have now, for some years, performed Lawson Tait's colpo-perineorrhaphy as modified by Doleris and Pozzi, to which we invariably add a myorrhaphy of the levator ani. The two rami of the muscle are fully exposed on each side of the rectum and vagina and sutured by a

continuous superimposed suture in the middle line. The vaginal tissues are then treated exactly as in the Tait's operation. This method has never failed to give us admirable results, and if supplemented by the anterior colporrhaphy presently to be described, gives the best possible support to a prolapsed uterus—indeed, in the majority of severe procidentia cases, combined with a solid ventrofixation, it is almost invariably curative, and I have never seen a patient return to me with a relapse. This operation is supposed to affect later the second stage of labour. My experience has so far been a happy one, I do not remember hearing that any of my patients had difficulties in their subsequent pregnancies.

Cystocele, or hernia of the bladder, is generally associated with prolapse of the uterus, but it not infrequently exists alone, or to speak more accurately precedes that of the uterus. The structures generally affected are both layers of the triangular ligament and secondarily the most anterior fibres of the levator ani muscle.

The usual method of dealing with this condition has been to remove an oval or triangular portion of the anterior vaginal wall and thus reduce the redundancy of the protruding viscera. The operation is, however, totally ineffective if the cystocele is extensive.

We have conjointly, with the perineal operation, performed another very similar to that of Donald of Manchester, by which the whole of the lower portion of the bladder wall is freed from the cervix and vagina anteriorly. The latter is then resected as widely as necessary, the bladder pushed back into the pelvic cavity, and the incision closed by a mattress suture which involves first the deep fascial layers, and finally the vaginal mucous surface. This method successfully raises the whole of the pelvic vesical plane, although it does little to modify the uterine one, but it generally proves curative to the cystocele and relapses are exceedingly rare.

Hernia of the Pelvic Contents.

When the uterus and its adjoining visceral connections have crossed the vulvar boundary and escaped entirely outside, the prolapse is described as complete. This condition is rightly considered as, and styled hernia of the pelvic contents, inasmuch as the uterus alone is not the only organ which has lost the right of domicile in the pelvic cavity, but the vagina is also completely inverted. In extreme cases a posterior enterocele may exist simultaneously.

The analogy with ordinary hernia is therefore complete. The operations which have been devised to deal with this condition, especially when occurring in middle-aged women, cannot so far be said to have met with general success. When the prolapse is not severe and is of recent origin, some of the methods already advocated for ordinary prolapse are of service. Generally speaking, however, the seriously impaired nature of the herniated uterus, renders the

retention of this organ inadvisable, and an attempt should be made, after its removal, to resect the redundant vaginal tissues, and as advised by Fothergill "unite the parametric and paravaginal tissues in the middle line." In a case in which malignant degenerative changes had started in the prolapsed uterus, I performed vaginal hysterectomy, followed by the suture together of the base of both broad ligaments, to which I added an extensive anterior and posterior colpo-perineorrhaphy with a myorrhaphy of the levator ani. The vagina was thus practically occluded, and so far as I am aware the prolapse has not returned. In another, but younger, patient, I opened the abdomen, amputated the uterus at the seat of election, sutured the broad ligaments one to another and to the stump, and fixed the pedicle to the abdominal incision. Two years after the patient returned with a very marked cystocele and rectocele, for which I had to perform an extensive double colpo-perineorrhaphy.

There was some improvement, but only of a momentary nature, as the vesical displacement has again become obvious and will undoubtedly become more so in the near future.

In order to relieve these severe cases of prolapse occurring in women who have passed the menopause, and with a marked tendency to adiposity, and a general flaccidity of their connective tissue, the so-called "interposition operation" has been advocated. The anterior vaginal cul-de-sac is opened, as in the preliminary step of vaginal hysterectomy, the fundus delivered through the incision and secured to the anterior vaginal wall and also to the posterior surface of the os pubis immediately before it. The bladder is pushed right up in the pelvis and the uterus in its new position acts as a sort of stop cock to the rest of the vaginal organs preventing their outward and downward displacement.

I have no experience of this operation, nor of that of Professor Muller, of Berne, who advises and performs in similar occasions the resection of the whole vagina and the closure of its cavity.

No doubt the desperate character of these cases justifies all audacities, although owing to the very unsatisfactory nature of the ground on which one operates, even these radical methods of treatment have been known to fail to remedy what is frequently beyond the power of surgery to relieve and much less to cure.

Conclusions.

As a summary to the preceding considerations we may draw the following conclusions.

1st. That the pelvic viscera are both suspended and supported organs.

2nd. That the "pelvic floor" forms one solid mass separating the pelvic cavity from the exterior, just as the anterior abdominal wall separates the abdominal cavity from the exterior.

3rd. That it includes part of the viscera, as well as the so-called ligaments of the uterus, of which they are an integral part.

4th. That relaxation of part or the whole of this fibro-muscular, cellular, vascular and peritoneal diaphragm results in the production of the different forms of pelvic displacements.

5th. Relaxation of the upper pelvic segment leads to retro-deviations and partial uterine descent. That of the lower to cystocele, colpocele and rectocele. Relaxation of the upper and lower segments to classical prolapse. The intensification of the combined conditions is productive of hernia of the pelvic contents or total prolapse.

6th. Relaxation of the upper pelvic segment is curable by the so-called round ligament operations of which Alexander's and Simpson's are the best types. Descensus uteri, especially in middle-aged women demands ventro-fixation combined with plastic operations on the vagina and perineum.

7th. Prolapse should always be operated upon. Classical prolapse, by a combined anterior and posterior colpo-perineorrhaphy, with union of the paravaginal tissues in the middle line, and a myorrhaphy of the levator ani and frequently also in addition a ventro-fixation; cystocele and rectocele by the combined perineal and vaginal plastic operations.

8th. Hernia of the pelvic contents justifies all these preceding operations, but may best be treated by vaginal or abdominal hysterectomy with suture in the middle line, and if possible to the abdominal incision of the overstretched perivascular sheaths. In extreme cases, the interposition operation may be tried, or when everything else fails P. Muller's excision of the whole vaginal canal.

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The Anatomy of Tubal Convolutions and the Mechanism of Tubal Occlusion.

By James Young, M.B., F.R.C.S.E.,

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The following paper is an account of some observations on the structural changes which the tube presents in the formation of convolutions in its course, and incorporates an attempt made from microscopic data to explain the processes involved in the disappearance of the tubal fimbriæ and closure of the abdominal ostium in cases of salpingitis and tubal pregnancy. For the specimens on which the investigations were carried out I am indebted to the generosity of Dr. Haig Ferguson.

The Anatomy of Tubal Convolutions.

A convoluted state of the Fallopian tube in the adult may be congenital, representing a persistence of the convolutions present in the fœtus, or it may be an acquired condition. The latter may be due to kinking the result of inflammatory adhesions to neighbouring structures, or it may be caused by any process which leads to an increase in the total length of the tube. An increase in length may occur in two different ways: it may be dependent on a salpingitic thickening and increase in the substance of the tube wall, or it may be a sequel of distension of any part of the tube, such as is found in cases of hydrosalpinx and tubal pregnancy. The investigations recorded in this paper were carried out in specimens belonging to the latter class.

A rational explanation of the formation of convolutions in the course of a distended tube is as follows:—The insertion of the tube into the broad ligament at the fimbriated end would tend to prevent it from becoming displaced in an outward direction subsequent to an increase in its length, and the fixation at the uterine end would preclude the possibility of the tube becoming carried inwards. The consequence is that, to accommodate its greater length, it has to double up between the outer and inner attachments. The mechanism of this is easily understood when we remember the loosely-fitting nature of the serous coat and the fact that the layers of the broad ligament can be separated from one another with comparative ease. It is a matter of common observation that the peritoneal coat is found in many specimens of tubal convolution to extend as a

continuous loose covering, bridging across the intervals between the successive portions of the bent tube. This explanation of the process would seem to apply to many cases.

That this simple interpretation, however, does not embrace all the facts I have been convinced by a study of the microscopic changes detected in a number of my specimens. On Plates A and B are represented photomicrographs of sections of a tubal convolution. The two portions of the tube lumen are seen, each with its mucosa surrounded by the inner circular coat of muscular fibres. External to this, and detached from it, the outer coat of muscle is seen. It is to be noted that, whereas each portion of the lumen is encircled by a well-defined band formed by the inner muscular layer, the outer coat of muscle is seen to extend, almost without interruption, as a common investment round both portions of the tube. The absence of the outer muscular layer between the two regions of the bent tube has resulted, in places, in the two areas of the inner muscular coat becoming apposed the one to the other.

The lax arrangement existing between the two muscle layers of the tubal wall, which is well demonstrated in the figures, and which permits of an easy detachment of the outer coat and peritoneum from the underlying inner coat, I have already referred to in a paper previously published. This anatomical consideration would seem to furnish an explanation of the above-recorded facts. As the mucous membrane and inner coat of muscle are closely adherent to one another, and the intimacy of this attachment is increased by the fact that muscular fibres pass into the larger of the mucous rugæ, these two layers together form a well-supported structure and in any displacement will tend to move together. The loose arrangement in existence between the two muscular coats and the fact that the peritoneal layers of the broad ligament can separate with ease, permit of the inner portion of the tube becoming doubled-up within the two outer investments. That the outer layer of muscle may in this way form a continuous sheath for the doubled-up inner coats of the tube would seem to explain why in so many cases the presence of a twist, which escapes detection by the eye, is recognized when the tube is rolled between the finger and thumb. This I have observed repeatedly.

The study of the microscopic appearances presented by sections made across the tube in the convoluted region has, in addition to the above observations, disclosed a fact of considerable interest and importance in relation to the question of salpingitic fusion of the mucous folds. The condition to be described was detected accidentally in an attempt made by the study of serial sections to determine the exact nature of the obstruction on the inner side of the tube in several cases of hydrosalpinx and tubal pregnancy.

PLATE A.

FIGS. 1–3.

Convoluted tube traced in series. See that mucosa and inner muscle coat are bent up within outer coat which forms a common sheath for both parts. In left portion see apparent fusion of folds. Note that inner coat of muscle apparently thicker in 1 than in 3; this is due to fact that in 1 it is cut across more obliquely.

PLATE B.

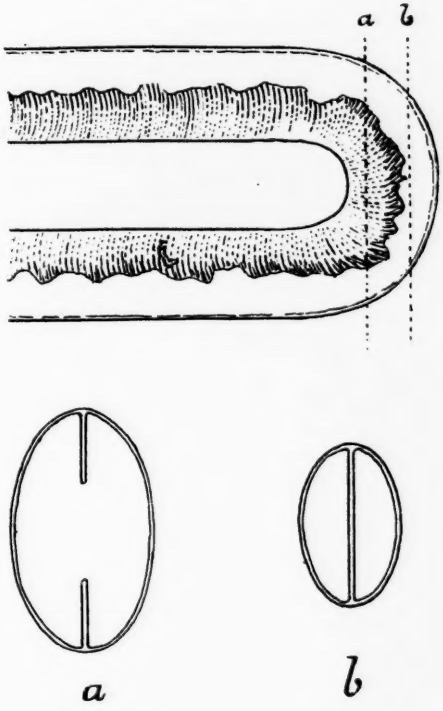
4

5

FIGS. 4–5.

Convoluted tube represented in Plate A cut across further along. See that left part becoming drawn out, and that the apparent fusion of folds, which is still present in 4, has disappeared in 5.

PLATE C.



In the upper figure is shown a portion of a bent tube into the lumen of which a mucous fold projects; *a* and *b* represent sections carried across the corresponding planes and show how fusion of the mucous folds may be simulated (diagrammatic).

In tracing sections across convoluted regions of the tube the appearances represented in figures 1—5 (Plates A and B) were discovered. In some of the sections there was seen apparently well-marked fusion of the folds across the tube lumen. On pursuing the sections in one direction this portion of the lumen (the left in the figures) was found to become smaller and smaller, and ultimately disappeared, apparently ending blindly. In the other direction serial tracing revealed the fact that the tube lumen became larger and more oval, until it became drawn out to the extent shown in figure 5, plate B. Still further along, the one portion was found to divide into two. As the sections were followed in this direction the apparent fusion disappeared, the folds concerned appearing to separate again, and this state continued throughout the subsequent sections. A little reflection is sufficient to indicate that the apparent fusion is, in reality, due to the fact that in cutting the sections a bend in the tube was being traced. The complete mucous bridges across the lumen correspond to the folds on the convex aspect of the tubal curve. As the sections are traced each of the same folds is seen to be cut across in two places, at opposite poles of the lumen; this explains the apparent separation of the fused folds. Plate C diagrammatically represents how sections carried across a single fold of the bent tube may erroneously indicate the existence of fusion. Of the two lower figures, representing sections carried across the corresponding planes in the bent tube, *a* shows the smaller portion of the lumen with the apparent fusion, and *b* shows the larger portion of the lumen with the apparent separation of the folds.

These observations would seem to be of considerable importance in relation to the question of the presence or absence of fusion of the folds in a given specimen, and would indicate that this condition may be erroneously diagnosed unless the tube is examined with the aid of serial sections. This is especially the case in view of the fact that abnormal conditions, which necessitate microscopic examination, are often associated with a convoluted state of the tube which may be overlooked. In some cases the sections may reveal an apparent fusion so intricate as, at first sight, to contraindicate the likelihood of its being interpreted in the above manner, and yet several times I have found that, in serial tracing, the folds in such specimens again become separate and that the tube is, in reality, convoluted. The complex arrangement present in these cases is due to the elaborate branching of the mucous ridges.

In many cases the investigator finds it impossible to devote the time necessary for the purpose of transforming the portion of the tube to be examined into sections cut in series. To those to whom this may apply the following suggestions may be helpful:—

(1) Where the tube is obviously convoluted especial care must be taken in the examination.

(2) If the apparent fusion follows a very simple arrangement, represented by straight mucous bridges extending across the lumen, the condition is probably to be explained as above. The presence of a seemingly complex fusion, however, does not necessarily preclude this interpretation.

(3) If the lumen concerned is smaller than it should be, this, in my experience, is due, in the large proportion of cases, not to a constriction in the course of the tube, but merely to the fact that the section is carried across the convex aspect of the bent tube (Plate C).

(4) If the lumen presenting the apparent fusion is distinctly oval on section this should arouse the suspicion of the investigator that he is dealing with a convolution, though, of course, it may merely indicate that the section is carried obliquely across a straight part of the tube.

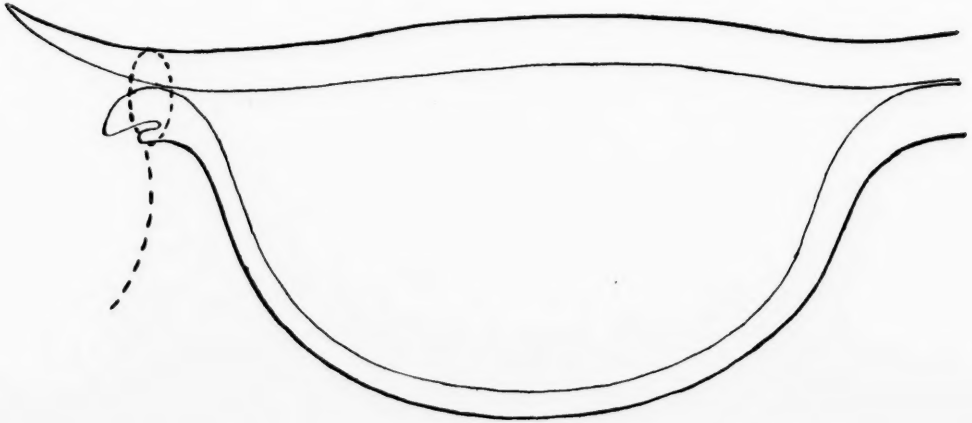
The Mechanism of Occlusion of the Abdominal Ostium.

Although the process involved in the occlusion of the abdominal opening of the tube is one of the most interesting and important (and withal one of the most difficult) subjects in the pathology of the genital tract, it does not seem to have received more than a scanty attention in the literature.

This section of the paper is in part an amplification of a section of a communication on the "Anatomy and Histology of the Pregnant Tube" which I made to the Edinburgh Obstetrical Society in July of this year, and which was subsequently published in the *Edinburgh Medical Journal*.[1] In that paper I described four specimens of tubal pregnancy in which there was a marked distension and thinning of the tube wall in the ampullary portion, and in which there was present distinct recession of the tubal fimbriæ. In three of the cases the attenuation of the tube wall was extreme and extended right up to the abdominal aperture. These observations led me to conclude that the condition was in all probability associated with the process of stretching of the tube and not, as has been suggested by Alban Doran [2] and Kleinhans,[3] due to a swelling and increase in the substance of the tube wall, which elongates and projects beyond the fimbriæ, which thus, as it were, become engulfed. This conclusion was especially supported by the study of one of the cases mentioned, which first directed my attention to the problem, where the fimbrial recession was found to have occurred only in relation to that portion of the tube which had become distended to form the wall of a blood

1. *Edin. Med. Journ.*, August, 1909.
2. *Lond. Obstet. Trans.*, Dec. 4, 1889.
3. *Veit's Handbuch*, 1st ed., vol. iii, 2.2, p. 690.

PLATE D.



Diagrammatic representation of tube distended in lower aspect, the remaining portion of the wall unchanged. There is distinct fimbrial retraction in the distended part, the other fimbriæ remaining unaltered.

cavity, the fimbriæ corresponding to the unaltered wall remaining unchanged. This is represented diagrammatically in Plate D.

If this interpretation of the process be correct, namely that it is dependent on, and occurs during the stretching of the tube wall, there must of necessity be present a gliding of the inner portion of the tube over the outer, leading to a withdrawal of the fimbriæ, which are merely exuberant projections of the mucosa beyond the abdominal opening.

The anatomical structure of the tube is found to lend favour to this hypothesis. The presence of the longitudinal mucous rugæ will enable the tube to withstand an attempt at distension more efficiently in the longitudinal direction than in the transverse. To quote what I wrote in the paper above-mentioned "to produce distension of the tube in the longitudinal direction the force exercised by the increasing contents has to contend with the longitudinal bands in the shape of the mucous ridges which strengthen the tube wall on the inner aspect. The resistance to a stretching force on the part of the rugæ is probably enhanced when they are turgid with decidual cells." It occurred to me that the key to the problem is to be found in the existence of the longitudinal mucous ridges. This idea, which occurred to me independently, I subsequently learnt had been previously mooted by Opitz.[1] Starting from the same assumption Opitz and I have, however, arrived at different conclusions, and it is my object in this paper to record further observations made in this connection, and also to publish the illustrations which the lack of space prevented me from doing in my former paper.

Opitz explains the disappearance of the fimbriæ in a distending tube as due to the gliding of the mucosa and muscular coats of the tube as a whole within the loosely adherent serous covering. An extended investigation of the histological changes encountered in the tube has led me to the conclusion that the site of the gliding process is in all probability between the two muscle layers.

The examination of sections of inflamed and pregnant tubes not infrequently reveals the existence of a greater or less separation of the muscular coats from one another by an œdematous effusion. In the pregnant tube, in addition, the easily separable nature of the muscle coats is recognized in some cases by the existence of a blood tract between the inner and outer layers which may extend for a considerable distance from the site of the hæmorrhage in the region of the ovum bed. The fact that blood effused into the tube wall can, in this way, find an easy site for its accommodation, may partly explain the tendency, which the ovum has been noted by

1. *Zeitschr. f. Geburtshülfe und Gynäkologie*, 1904, vol. lii, p. 485.

several observers to exhibit in its growth, of burrowing along and around the tube wall between the two muscle layers. In so doing it would seem to be influenced by the site of the nourishing blood lake. The ease with which the outer stratum of muscle can be detached from the inner may, of course, of itself explain the phenomenon.

In figure 1, Plate E, which represents a section from the uterine end of a tube in the ampullary portion of which a two months' fœtus had developed, the loosening of the muscular coats by œdematous effusion is strikingly shown. On the upper and right aspect the outer layer is seen to be completely detached by a blood tract such as that described. This was traced to the region of the ovum bed. In figures 1–5, Plates A and B, which have been described in the former portion of this paper, are shown sections from the uterine end of a tube distended to form a hydrosalpinx; the tube was convoluted in the region concerned, and the lumen is cut across in two places. In these sections the loosening and separation of the muscle layers is clearly demonstrated; the mucosa and inner muscular layer have remained closely adherent and form together a band of considerable thickness, whilst the outer muscular stratum and the peritoneum are detached, in places almost completely.

A fact of considerable importance in this connection has been described in the former section of the paper, namely that whilst each portion of the convoluted lumen is surrounded by its own investment of the inner coat of muscle the two portions of the tube are surrounded in common by the outer layer. These observations, which indicate that the folding of the tube on the inner side of a distended ampulla may involve only the mucosa and internal muscular layer, the longitudinal coat simply stretching to accommodate the doubled-up tube, demonstrate in a convincing manner the loose arrangement existing between the two muscle layers and show that in any displacing movement the mucosa and inner coat of muscle are apt to override the peritoneal and outer muscular coats.

Towards the fimbriated end of the tube the muscular fibres of the two layers interlace irregularly with one another, but here there may be a more or less complete separation by an œdematous effusion. Figure 2, Plate E, which represents a longitudinal section of the outer end of a tube with retraction of the fimbriæ, suggests the presence of a shearing or gliding movement such as we have conjectured.

In view of these "findings" it seems probable that the recession of the fimbriæ in cases of hydrosalpinx and tubal pregnancy is dependent on, and occurs during, distension of the ampullary portion of the tube. In tubal gestation the tube becomes distended to accommodate the growing ovum situated in its wall, or the products of abortion—ovum and blood—which

PLATE E.

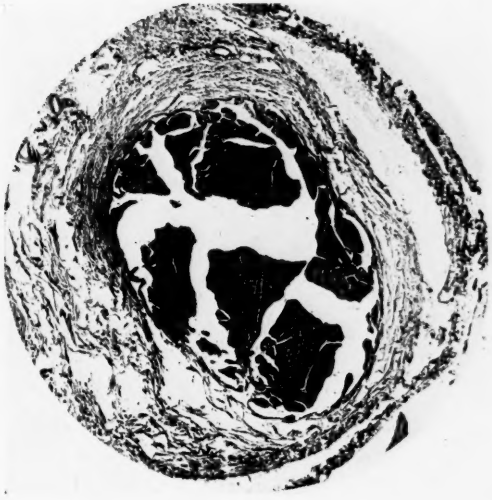
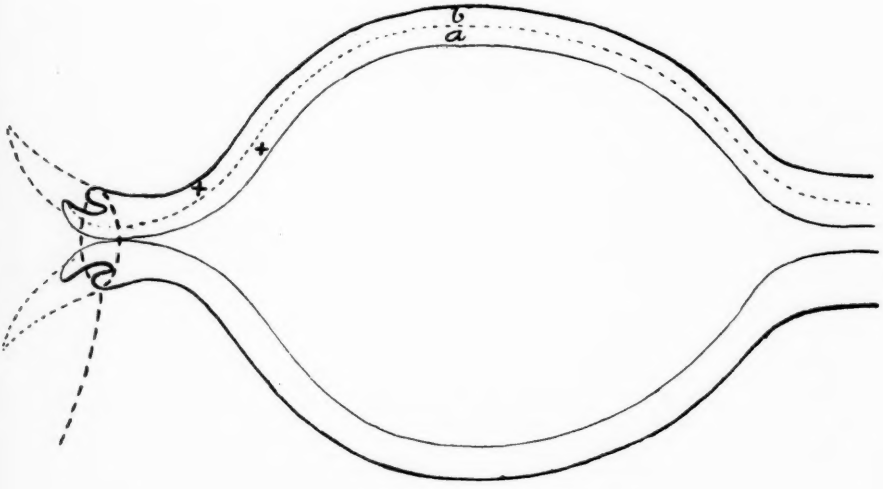


FIG. 1.—Section near uterine end of pregnant tube showing folds turgid with decidual cells. Hæmorrhage to the right: œdema and loosening of tube wall.

FIG. 2.—Longitudinal section through fimbriated end of pregnant tube. On upper aspect see retracted fimbriæ; below, the tube wall with a loosening and separation of the muscular tissue suggesting the existence of a shearing movement.

PLATE F.



Represents diagrammatically the mode of retraction of the fimbriæ within the peritoneal ring indicated by the dotted line. The letter *a* is placed on the inner "tube," formed by the mucosa and inner coat of muscle, and the letter *b* on the outer "tube" formed by the outer muscular layer and the serous coat. The interval between the two crosses is intended to represent the amount of retraction of the inner "tube" within the outer, leading to an indrawing of the fimbriæ.

escape into the tube lumen as the result of internal rupture. In hydrosalpinx the distension is due to the gradual accumulation of the fluid contents of the tube. The formation of a hydrosalpinx and, in all probability, of a hæmatosalpinx in the outer portion of the tube can occur only after the establishment of an obstruction of the abdominal opening. There must be, also, in the case at any rate of the hydrosalpinx, an obstruction on the inner side. This, in view of the more viscid nature of the blood and the fact, moreover, that it clots soon after being poured out, is probably not a necessity for the production of a hæmatosalpinx.

The tube, as pointed out by Opitz,[1] is inserted at its outer extremity into a slit in the peritoneum. The peritoneal "ring" corresponding to its attachment probably withstands a considerable tension without stretching. This resistance to a stretching force is probably increased when the peritoneum becomes thickened by an inflammatory process extending from the affected tube—in this way the "peritoneal ring" becomes converted into a "peritonitic ring" (Emil Ries). As the consequence of a salpingitis or the congestion associated with tubal pregnancy the fimbriæ become swollen and, as expansion in an outward direction is prevented by this ring, they become pressed together; this leads to a functional occlusion of the opening. The process at work in the production of the obstruction at the outer end is thus not difficult to follow. The nature and cause of the obstruction on the inner side of the distended tube is, on the other hand, not so clearly understood—it may be, as before, due to swelling of the mucous ridges or it may be mechanical in origin, the result of kinking in the course of the tube.

The tension to which the tube is subjected by the increasing contents leads to a stretching and thinning out of the tubal walls. The rigidity of the peritoneal ring tends to prevent the ostium from becoming opened out. In some cases, however, the ring, also, gives way, and the relief of the obstruction at the outer end thus produced may result in an escape of the contents. The tube then, probably, more or less regains its normal diameters and there may be present only a slight, if any, alteration in the fimbriæ. If the ring holds out a different sequence of events probably ensues.

The mucous membrane of the tube and the inner coat of muscle, as already described, are intimately adherent the one to the other, and together may be considered to form a well-supported tube lying within a loosely fitting and distensible sheath formed by the outer muscle coat and peritoneum (see page 312). The inner "tube" is strengthened on its internal aspect by the longitudinal mucous ridges which enable it to withstand, probably with a considerable measure of success any longitudinal strain. For this reason the distending force acting from within will lead to a stretching of the

1. *Vide supra.*

inner portion of the tube wall more in the transverse than in the longitudinal direction. This disproportion between the degrees of expansion of the tube in the different diameters is, however, to a certain extent compensated for by the fact that, with a taut peritoneal ring, the loose fit between the two parts of the tube wall enables the mucosa and inner stratum of muscle to be drawn within the outer muscle layer and peritoneum to take part in the formation of the wall of the tube sac (Plate F). The same process in all likelihood occurs to some extent even with a giving way of the peritoneal ring, but as this means a certain degree of inward movement of the outer portion of the tube wall the recession of the fimbriæ is obscured.

It would seem probable that, after the disappearance of the fimbriæ within the tube lumen, the occlusion of the ostium is completed either by a fusion of the fimbriæ with one another or by a union of the margins of the "peritoneal ring."

In a paper, which includes an excellent critical analysis of the literature on the subject, Dr. Emil Ries[1] has recently advanced another theory to explain the occlusion of the abdominal ostium. According to him, as the result of the escape of the septic contents of the inflamed tube, there is induced an inflammation of the peritoneal ring encircling the abdominal ostium. This becomes resistant and firm and prevents expansion of the swollen fimbriæ; these become pressed together and lead to a functional occlusion of the opening. As the result of this the tubal secretion is dammed back and leads to a distension and stretching of the tubal walls. "The fibrous cicatricial ring gives less than any other part; therefore, the muscular coat and its serosa become stretched more than the ring around the ostium. With the inflammation subsiding, as tubal inflammations so frequently do, the contents of the tube are absorbed or discharged in one direction or another, the swelling of the folds subsides, the walls become too large and loose . . . The peritonitic ring thereby gains in mobility and can contract further over the fimbriæ. The fimbriæ escape being pinched by the ring, or, rather, the fimbriæ being covered with epithelium cannot adhere to the peritonitic ring and escape inwards without inversion. The ring can now close completely, and we have a closed tube. The union of the peritonitic ring is a sero-serous one . . ."

Against this, at first sight, plausible explanation of the phenomena, several strong objections can be urged. For the recession of the fimbriæ this theory presupposes one or more previous salpingitic attacks. In his paper, however, Dr. Emil Ries has not referred to the fact that the same phenomena are encountered with a tubal pregnancy or hæmatosalpinx situated in the outer end of the

1. "Amer. Journ. Obst. and Diseases of Women," August, 1909.

tube. The fimbrial recession in these cases does not of itself militate against a theory such as that here advanced, especially in view of the close relationship which has been shown to exist between salpingitis and tubal pregnancy. The knowledge, however, that the phenomena are rarely, if ever, detected in tubal gestation, save where the ampullary portion of the tube is involved in the distension, suggests that the fimbrial recession is secondary to the ingrafting of the ovum.

The fact, moreover, that the engulfing of the fimbriæ is associated with a functional occlusion of the abdominal ostium indicates that an inflammatory attack resulting in its production will prevent the ingress of the ova. This would seem highly probably, even according to Ries' theory where the condition is supposed to be due to a gradual cicatricial contraction of the encircling peritoneal ring—the bunching of the fimbriæ within the gradually diminishing aperture would seem to imply an occlusion of the opening.

I would advance these considerations as a strong argument in favour of the fact that the retraction of the fimbriæ in a case of tubal pregnancy is established subsequent to, and is dependent on, the structural changes induced in the tube, and is not the result of an inflammatory process preceding the ingrafting of the ovum in the tube wall.

Whilst Dr. Emil Ries has made out a good case for the existence of the "increased mobility" of the peritoneal ring subsequent to the collapse of the distended tube, he has not made it clear why the ring should, in the process of contraction, tend to advance outwards over the fimbriæ, thus leading to their being engulfed. The fimbriæ, which form on section a wedge, the apex of which is directed towards the tube lumen, would tend rather to offer a mechanical hindrance to a gliding movement of this nature.

One occasionally discovers a certain amount of recession of the fimbriæ in a tube which is not distended or where there is only slight distension, and this might at first sight seem to militate against the "distension theory." In these cases, however, it would seem not impossible that the retraction is the result of a preceding distension which has wholly or partially disappeared.

An analysis of the various theories advanced to explain the disappearance of the tubal fimbriæ reveals the fact that they fall under one or other of two headings:—

(1) The first class includes the theories, which explain the process as being due to an increase in the total length of the tube wall, which, by expanding in an outward direction, becomes projected beyond the tubal fimbriæ. According to the theory of Alban Doran, which receives the support of Kleinhans, the increase in length is dependent on the swelling and

increase in substance of the tube wall associated with salpingitis, etc. According to Emil Ries the gliding outwards of the "peritoneal ring" over the fimbriæ is rendered possible by the fact that the walls become loose and redundant subsequent to the collapse of a distended tube.

(2) In the second category are included the theory of Opitz, which explains the process as due to retraction of the muscular and mucous coats of the tube within the serous coat, and the theory described in this paper, in which the gliding process involves only the mucosa and inner coat of muscle.

In the so-called "perimetritic closure" of Alban Doran the sealing of the opening is explained by a matting together of the fimbriæ by inflammatory adhesions without a preliminary recession.

SELECT CLINICAL REPORTS.

(Under this heading are recorded, singly or in groups, cases to which a special interest attaches either from their unusual character or from being, in a special sense, typical examples of their class).

A Case of Puerperal Septicæmia with Double Septic Pneumonia with effusion—Death thirty-four days after Confinement.

By Fred A. Simpson, B.A. (Cantab.), M.R.C.S., L.R.C.P., Accrington.

The following case will, I think, be of interest both from its medical aspect and as emphasizing to the general practitioner the necessity of carefully watching the simplest of maternity cases and also the vast importance of promptly dealing with any urgent symptoms that may arise.

The patient, a married woman, aged 24, was a thin, delicate-looking girl—one of a family of 17. The family history was only fair—there being cases of malignant disease and tuberculosis in some of the other children—the parents, however, are both living and appear healthy. Her husband is a particularly strong healthy man.

Previous history. She had had 2 confinements; instruments were used with the first. On examination I found the cervix badly lacerated. She had also had 2 miscarriages (cause unknown). There had been no previous illness of any moment.

The patient was confined about 8-0 a.m., July 27, of a full-term child. The doctor was not present, but sent a nurse who arrived shortly after and reported everything to be right. There had been no vaginal examination or manipulation of any kind. The surroundings were fairly clean for the class of house.

I was called to the patient about 9-15 p.m. on August 1, being told she had "pain in the stomach" and that neither the doctor nor the nurse had been near the house since the one visit by the nurse on July 27.

I could not elicit a very definite story as to her condition on the previous three days—as far as I could gather she had not felt "very well," but had not had any rigors, headache or any tangible sign of illness. I found her with rather an anxious expression and complaining of some tenderness in the lower abdomen, but no actual pain.

On examination, the tongue was clean, the breasts were soft and

did not contain any milk; the abdomen was tender on pressure; there was slight subinvolution of uterus; the lochia were reported all right. The temperature was 102·6°F., the pulse 108 and the respiration normal. I gave calomel, gr. v, a little ergot and a 1–1000 perchloride douche.

Next morning (9-0 a.m.) the temperature was still 102·6°F., and the pulse 106; the bowels had been moved during the night.

At 10-30 a.m., Dr. Greenwood kindly giving an anæsthetic, I explored the uterus—using a sharp curette and my fingers. I removed several pieces of placenta and membranes, and douched thoroughly with a 1–500 solution of perchloride of mercury. I was able to get my finger round the whole of the uterus. The placental site did not appear very healthy. A hypodermic injection of ergotin was given.

The same evening the patient was easier, though the pulse was still rapid and the temperature 101°F.

Aug. 3. Temperature 103·2°F. Pulse 118. No lochia and somewhat bad smell.

Aug. 4. Temperature 103·6°F. Pulse 122. No lochia. I injected 20 cc. antistreptococcic serum in 10 cc. doses at intervals of 8 hours.

Aug. 5. Temperature 102·8°F. Pulse 118. I injected another 10 cc. serum.

Aug. 6, 7 and 8. The temperature was still above 102°F.; the pulse 120; the patient was otherwise comfortable. She took nourishment well, having brandy and champagne alternately every two hours. Medicinally she was having quinine, strychnine and digitalis. On Aug. 8 she complained of some slight cough, but there were no adventitious sounds in the lungs.

Aug. 9. The patient was very ill. Temperature 104·8°F. Pulse 124. Respiration 27. Some moist râles were audible at the right base. In the evening Sir William Sinclair kindly saw the patient. He made a vaginal examination and found the uterine condition satisfactory with fair involution and no signs of peritonitis or any perimetritic trouble. He advised calomel gr. ss every hour and continuing the alcohol and cardiac stimulants as before.

Aug. 10. Temperature 103°F. Pulse 120. Respiration 30. In the evening the patient complained of pleuritic pain in the right side —there were some pneumonic signs at the right base.

On Aug. 11 she was better. Temperature 99·8°F. The signs in the lungs were still present.

Aug. 12. The patient had a good morning but was not so well later in the day. Respiration 48. Pulse 140. Temperature 103°F. In the evening the pleuritic rub was very well marked and the patient had very little sleep, being in considerable pain.

Aug. 13. The pleuritic rub was absent and no breath sounds

were audible at the right base. I put in a small exploring needle and withdrew fluid. I then aspirated and withdrew ʒxv of greenish-yellow fluid. One hour after, the respiration dropped from 48 to 36 and the patient was more comfortable. Temperature 98·4° F. 2-0 p.m.: Temperature 100·6°F. Respiration 32. Pulse 128. 3-0 p.m.: The patient was comfortable and free from pain. Temperature 99·5°F., Respiration 38, Pulse 122 and very small. One pint of normal saline solution was injected subcutaneously.

August 14. There were some pneumonic sounds over left chest. One pint of saline was given per rectum.

Aug. 15. Incontinence of fæces was present. At 10-0 a.m. she was fairly comfortable after a bad night (Pulse 142, Respiration 56, Temperature 100°F.) and maintaining her strength and taking nourishment well. The signs of pneumonia were well marked in both lungs.

At 2-30 p.m. she was not so well, and at 10-0 p.m. was worse. Pulse 152 and very small. Temperature 101°F. (after sponging). A pint of saline was again given subcutaneously.

On Aug. 16, at 1-30 a.m., she was much worse (Pulse 160, Respiration 58, Temperature 102·4°F.) and seemed weaker than at any period of her illness. Strychnine and digitalin were given hypodermically.

At 8-0 a.m. there was distinct improvement: the pulse was of better volume, rate 144, respiration 48, temperature 101°F., and she was altogether stronger. The cough had been rather troublesome during the last three days.

On Aug. 18 considerable increase of fluid in right chest was noted. Aspiration was performed and ʒxvj of yellow fluid—very foul-smelling and just ready to become pus—was drawn off. She was more comfortable after this.

On Aug. 20 the temperature was normal at 8-30 a.m.; she had an attack of dyspnœa during the day and at 7-0 p.m. ʒxxj of purulent fluid were withdrawn, but not as foul as on the previous occasion.

At about 9-0 p.m. she collapsed, so a pint of saline was given subcutaneously and a hypodermic of strychnine.

At 10-30 p.m. she was better (Temperature 101°F., Respiration 42, Pulse 144).

On Aug. 21 she was moved by motor to her own home and stood the journey well.

Aug. 22, 4-30 p.m. Dr. Alan Greenwood anæsthetised with a mixture of chloroform and ether. I made an incision 3 in. long between the 8th and 9th ribs, opened the pleural cavity, let out a large quantity of purulent fluid and inserted large drainage tube without resecting a rib. She stood the operation well.

Aug. 23. Drainage very good—no vomiting. Brandy and champagne given through night. Patient slightly better. Pulse, temperature and respiration about same.

On Aug. 25 she was much worse; the pulse was weaker and at times almost imperceptible; the breathing was slow and shallow. She vomited twice. There was a slight rally about 6-0 p.m., temperature 97°; very little discharge from wound, the edges of which looked very unhealthy; the tube passage was quite clear; diarrhœa had ceased.

Aug. 26. Distinct rally; fair night; temperature 100°F in the morning; normal, 2-0 p.m., slight diarrhœa. In the evening the apex beat was slightly displaced inwards.

Aug. 27. Fair night. Sweating profusely. Wound healthier and discharge more free. Sputum sent for examination.

Aug. 28. Discharge rather foul smelling. No change. No tubercle bacilli in sputum. Numerous streptococci present, also some diplococci. Numerous polymorphonuclear leucocytes showing neutrophilic degeneration.

Aug. 29. Some pain in the left side during the night. Dr. Shaw, of Bacup, kindly saw the patient with me. At midday an exploring needle showed a little fluid. She became worse during the afternoon, and by 9-15 p.m. was very ill, was of a bad colour; dyspnœic; large quantity of fluid in left chest; almost unconscious. At 11-15 p.m., with Dr. Shaw, after giving ℥iv of brandy and morphia gr. $\frac{1}{4}$, I made an incision and drained the left pleural cavity and let free a large quantity of fluid. She never rallied and became gradually weaker and died at 2-0 a.m.

This case is, I think, of interest from the many complications supervening on the original symptoms and from the fact that the patient survived so long.

The uterine condition very soon subsided after removal of the retained products of conception: in fact, Sir William Sinclair pronounced involution to be almost normal when he first saw the case. At no period was there any peritonitis. The pneumonia was undoubtedly of a septic type—the temperature never, or hardly ever, rising above 102·5°F. I feel convinced that had I not drained the right chest the patient would have died earlier, as her strength would not have stood the repeated aspirations. The rapidity of the secretion of fluid by the pleura was remarkable. At the end Dr. Shaw was in entire agreement with me that the only plan was to drain the left chest, as aspiration appeared to us as a very poor method of temporising.

During the last week the condition of the pulse was worthy of note, as it hardly ever fell below 140 and at times was as high as 156. In fact, during the whole illness, this condition was remarkable. I was unable at any time to detect any signs of peri- or endo-carditis, although examining the heart several times daily.

As to medicinal treatment, I kept to strychnine and digitalis,

giving, as noted, occasional doses of other drugs as local symptoms arose.

A point worthy of note was the indomitable will power of the patient—on her worst days she would say to me: "I won't die"; and never once did she refuse nourishment.

On one point I am doubtful—did I persevere sufficiently with the antistreptococcic serum? and are the results obtained by its use sufficiently convincing to urge one to use large quantities, *e.g.*, 100 cc.?

I should mention the hygienic conditions of the woman before her move were very poor.

TECHNICAL MEMORANDA, OPERATIVE AND OTHERWISE.

(Under this heading will be published from time to time notes on points of practical interest in regard to methods of treatment, operative and therapeutic, and on the general management of Obstetrical and Gynæcological cases in hospital and private practice.)

Manual Treatment in Diseases of Women.

By Alice J. Stewart Ker, M.D., Birkenhead.

Manual treatment, manipulation, all that can be expressed comprehensively by the word "massage," is beginning to be a recognized form of treatment in this country, as it has been for some time in Scandinavia. Fractured limbs are now not permitted to suffer muscular degeneration from inaction, but are rubbed perseveringly during the time of their fixation in splints; and sprains, with similar treatment, can be practically cured in a week. If so much can be done in this way for the muscles of locomotion, it is easy to understand that the muscular layers of the abdominal wall and the muscular elements of the internal organs will respond to similar treatment in an equally satisfactory manner.

Vol. III. of this Journal contains a review of a book recently published by Dr. Norström of Stockholm, in which he explains his adoption of this treatment, and cites cases where he found it beneficial when all other methods had failed. His procedure consists in fixing the uterus by means of two fingers of the left hand placed in the vagina, while the right hand, on the abdominal wall, carries out the various movements of effleurage, pétrissage or malning, according to the nature of the case or the stage of the treatment. He reports almost immediate improvement and a large percentage of cures after sittings varying in number from 30 to 46.

In this country, massage has not taken the honourable place in the professional mind which it occupies in Scandinavia, where it is carried out by qualified practitioners, and not by otherwise unscientifically trained nurses. For this reason, its full advantages have never been fairly tested and proved to the satisfaction of an English professional community. It is possible that Norström's procedure would be regarded as too startling an innovation by British patients, who have become accustomed to surgical interference rather than to prolonged treatment of a more simple nature; and it would certainly

be more suitably carried out by medical women. A great deal may be done, however, by confining the manipulation to the abdominal wall, and endeavouring to restore to its muscular fibres the tonicity which they have lost, first by tight lacing, and subsequently, it may be, by various deviations from the normal consequent on weakness and disease. In the first place, the corset of civilization, even in its loosest and most innocuous form, always interferes with the muscular movements of the abdominal wall because of its rigidity; that quality, even when no actual tightness is present, preventing the bulging of the walls in one place and their retraction in another necessary to some of the movements of the trunk. Tight lacing is not so fashionable as it was some time ago, but there is not one woman in a hundred whose muscles have had free play all her life, and in many cases they are in the condition of the limb muscles after a fracture has been six weeks in splints. It is true that the fixation has not been so complete or so continuous, but that is counterbalanced by the length of time during which it has been kept up. The external and internal oblique and the transversalis muscles, therefore, are hardly ever found in a state of normal vigour in women; and when a strain comes upon them, such as the stretching during pregnancy, they are liable to be affected permanently by it in a way that would be impossible if they were as strong as they ought to be. Thus weakened, they are easily stretched beyond a point suitable for the recovery of their resiliency, and their want of tone influences the pelvic organs, the ligaments of which extend to the abdominal parietes. The faulty clothing having been discarded, the muscular fibres will be materially strengthened by a course of suitable massage which will prove a valuable addition to any other treatment found necessary. Manual treatment of the muscles is beneficial after childbirth and after abdominal operations, in both of which circumstances it will shorten the time of recumbency in bed, and prevent the evil effects of getting up too soon. After ventral fixation, massage of the muscles will lessen the risk of their stretching, and thus causing the relapses which are sometimes reported. Sometimes there is no definite lesion, as in one case treated by me, a mother of three children, who complained of a feeling of laxness in the lower part of the abdomen, with slight prolapse of the vagina, altering the position of the meatus urinarius so that the call to micturition had to be promptly obeyed. Daily massage for 10 or 15 minutes for a little over three weeks, without any alteration in the patient's active life, resulted in the restoration of tone to the abdomen, the disappearance of the vaginal prolapse, and no further trouble with the urethra. The pelvic blood-vessels and lymphatics can also be influenced by suitable manipulation. Some forms of menorrhagia and leucorrhœa, where no acute inflammation exists, are helped by a course of manual treatment directed towards

promoting the return of the blood by the pelvic veins and stimulating the action of the lymphatics. The manipulations also strengthen the muscular walls of the blood-vessels and prevent the relaxation which causes the congestion. In one case of long-standing menorrhagia, with general feebleness and want of tone in the whole system, whilst I cannot report a definite cure, the menorrhagia was lessened in a marked degree, and the heavy aching and oppression in the lower part of the abdomen much diminished. Change of residence removed this patient from further observation. In another case, where the uneasy symptoms were associated with obesity, a long course of treatment, extending over several weeks, diminished in a most gratifying manner the deposit of fat in the abdomen and hips, doubtless by promoting absorption.

It has been objected that this treatment would be harmful by directing the patient's attention, in a morbid manner, to the pelvic organs. Fully realising the importance of this objection, I would point out, that the constant uneasiness, sense of pressure and weight, and even actual pain and aching which characterize the ailments for which manipulation is here advised, have already directed the attention to those organs more absorbingly than any system of treatment would do; and that the prospect of relief from a new procedure, not involving a terrifying operation, would add a mental stimulus and encouragement that could not act otherwise than beneficially.

I do not suggest that manipulation should take the place of all other gynæcological treatment, but it undoubtedly has its place as a valuable adjunct, and as an alternative which should not be lost sight of, especially among the leisured and moneyed classes, who are willing to afford the time for a longer course of treatment, rather than face the risks of operation.

Acute inflammatory conditions are a contra-indication to the treatment, and even in chronic cases very careful bimanual examination must precede any attempt at massage, in case some collection of pus or fluid should be ruptured in the process, and set up peritonitis. The infliction of pain, if at all considerable, is an indication that the treatment is not being properly carried out; for skilled patience on the part of the operator will always result in toleration of the manipulations, even if some tenderness has been experienced at first. Personal fitness enters largely into the question, and some who practise massage can never render it painless, and still less, what it always ought to be, more or less pleasurable.

I would welcome an expression of opinion, and a record of experience, from those whose opportunities for investigation have been greater than my own.

CRITICAL REVIEW.

Recent work on the Etiology of Eclampsia.

By Eardley Holland, M.D., F.R.C.S.

Part II.

The significance of the effects produced on the body by Eclampsia, and their proper interpretation as regards the true nature of the disease.

Here we are not concerned with the cause of eclampsia, but with the nature of the fully-developed disease. In a classification of disease, under what heading should eclampsia be placed? This is a problem beset with many difficulties. For eclampsia is a disease not of one, or even of two or three organs, but of almost every tissue of the body (though the liver and kidneys show the most constant and striking changes): there is not one variety of pathological change, but several: further, the chemical alterations in the tissues and secretions are most complicated.

Broadly speaking, eclampsia is a profound toxic disturbance of the whole system, and as this toxic change arises from changes produced in the body itself, and not as the result of substances introduced from without, it is an autointoxication.

To apply the term "autointoxication" to a disease was, not so very long ago, considered to be a direct confession of ignorance of real facts. But it is not now the vague term it was a few years ago, for knowledge gained during the past few years has cleared the ground in a wonderful way. The truer conceptions of endogenous and exogenous metabolism, of the ultimate constitution of proteids, and of the autolytic changes produced by intracellular ferments, amongst other things, have placed the autointoxications upon a firm basis.

Numerous classifications of autointoxication have been given: on the whole it seems best to restrict the term to the disturbances produced by products of metabolism that have been formed within the tissues of the body (intermediary metabolism). The term metabolism must be understood in its widest sense, and to indicate any form of chemical or biochemical cell-activity—normal or otherwise. Eclampsia is intimately associated with abnormal cell-activity. During the course of metabolism innumerable organic compounds

are formed, some of which are of a more or less poisonous nature. As long as the body is in a normal condition, and as long as the compounds themselves are not too abnormal, either in quantity or quality, no harmful accumulation results. This is accomplished in the following ways:—

(1) Elimination from the body in the urine, fæces, etc.

(2) Combination with other substances into harmless or relatively harmless substances.

(3) Chemical alterations into compounds that are non-toxic or relatively innocuous.

A harmful accumulation of metabolic products or an auto-intoxication may result from any of the following conditions (Wells):—

(1) Failure of elimination, because of abnormal conditions in the eliminating organs; *e.g.*, uræmia.

(2) Failure of neutralization by chemical combination, presumably due to abnormalities in the organs or tissues through whose activities the neutralization is normally accomplished; *e.g.*, diseases of the liver.

(3) Failure of the chemical transformation of the metabolic products: this may result either from abnormalities in the functionating tissues or through a checking of the normal steps of metabolism by the failure of elimination of the end products.

(4) Excessive formation of toxic chemical substances; *e.g.*, autolytic changes in an organ, such as the liver, or the intoxication following superficial burns.

Eclampsia does not fall into any one of the above groups, but so complex and far-reaching are the anatomical and chemical changes that it may be truly said to present a combination of all four. We may attempt to use the dangerous method of reasoning by analogy in classifying eclampsia, but it does not help us much. In many respects eclampsia resembles uræmia—the renal disturbance and albuminuria, the decreased elimination of urea, the violent convulsions and profound coma terminating in death. But it is well known that there are many differences from uræmia: many other organs of the body are affected—the liver notably. Further, the renal changes are often in the background, and the elimination of the nitrogenous constituents differs very markedly from what occurs in uræmia. Eclampsia presents many points of resemblance to acute yellow atrophy of the liver: but this is only in certain cases, those in which the liver changes are remarkably profound: but in many cases the liver changes are poorly marked, and present scant resemblance to acute yellow atrophy. In other cases the picture resembles one of profound bacterial intoxication.

Most of the facts speak against the idea that one poison is responsible for the anatomical and chemical changes and symptomatic

manifestations of eclampsia. It is a mistake to speak of the "eclamptic toxin," for there are many. There are not only the poisonous substances that initiate the tissue changes, but also the toxic substances that accumulate because of the disorganization of the liver and kidney cells. Very possibly the toxic substances are similar to those most prominent in uræmia and acute yellow atrophy, for eclampsia seems to stand intermediate between these two diseases, encroaching on the characteristics of each.

These general statements will serve to prepare the way for a more concise enquiry. The basis of this enquiry lies in the principal changes that are found constantly in the body. These are:—

(1) A well-marked series of changes, culminating in necrosis, in the cells of various organs, especially in the liver and kidneys.

(2) A profound disturbance of metabolism, evidenced by:
   - (*a*) Altered ammonia coefficient in the urinary nitrogen.
   - (*b*) The presence in the blood and urine of abnormal end-products of protein: amino-acids, lactic acid, etc.
   - (*c*) The presence of abnormal end-products of protein in the organs of the body: *e.g.*, liver (Hofbauer).
   - (*d*) A high percentage of undetermined nitrogen in the urine.

(3) A profound blood-change, consisting in:
   - (*a*) Almost universal capillary thrombosis.
   - (*b*) Increased coagulability.
   - (*c*) Diminished alkalinity.
   - (*d*) Increased amount of fibrinogen.
   - (*e*) Evidences of destruction of red-corpuscles—hæmoglobin in the serum and urine.
   - (*f*) Leucocytosis.
   - (*g*) Fatty degeneration of the leucocytes (Shattock and Dudgeon)*

Using this complicated series of changes as the basis of the enquiry, an attempt must be made to interpret their significance aright. The anatomical and chemical changes must, as far as is possible, be correlated. The most outstanding feature of the picture is, that the body is saturated with the end-products of proteins (see pp. 267–268). Hofbauer has demonstrated abnormal organic and inorganic fatty acids in the liver and urine. Zweifel, Lockemann and Füth have found lactic acid in the blood, urine and cerebro-spinal fluid. The large proportion of undetermined nitrogen found in the urine by Zweifel, Ewing and Wolff is doubtless to be accounted for by amino-acids and other end-products of protein. In the same way the high proportion of ammonia-nitrogen in the urine

* Shattock and Dudgeon say: We believe that the fatty change present in the finely granular polymorphonuclear leucocytes results from the direct action of the Toxic substance in the blood itself: that is to say, that the change is one of fatty degeneration as distinguished from the ingestion or storage of fat by a healthy cell.

may be explained. Whence come these substances? They are absolute evidence of a profound disturbance of metabolism.

Hofbauer looks upon autolytic changes in the cells of the body, and especially of the liver, as playing a prominent part in eclampsia. In the liver the chief anatomical change is the severe cell degeneration: the chief chemical one is the presence of abnormal amino-acids, which represent the final phase of protein disintegration, such as would be produced by autolysis. The earliest changes in the eclamptic liver are cloudy swelling of the liver cells and endothelium of the capillaries at the periphery of the lobule: further changes are necrosis over a more extensive area (Konstantinowitsch).

Can the chemical and anatomical changes be correlated? They can. When autolysis occurs in a cell its protoplasm undergoes a series of degenerative changes; the earliest is cloudy swelling, a more severe one is fatty degeneration, and, finally, the cell structure is destroyed, and it passes into a state of necrosis. This is not speculation, but a fact that has been amply demonstrated. Paltauf showed that necrosis of cells is an autolytic process; Jacoby has demonstrated that anæmic necrosis of liver cells is an autolytic change; he also showed that the liver in acute phosphorous poisoning autolysed post mortem more rapidly than the normal liver, and that it exhibited during life changes analogous to autolysis. Autolysis has been proved in other conditions: it plays a prominent part in the resolution of pneumonia and in the involution of the uterus. In the macerated fœtus it has occurred to a remarkable extent a few hours after intrauterine death. The end-products of liver-autolysis have been thoroughly worked out by Jacoby and others, who found leucin, tyrosin alanin, asparaginic acid, glycocoll, purin bases, and fatty acids, especially lactic and formic acids. Hofbauer has found the same in the livers of eclamptic patients very soon after death, and others have demonstrated several in the blood and urine.

There is therefore ample justification for asserting that in eclampsia autolysis of liver cells occurs during life. Reference may again be made to Konstantinowitsch's paper. Necrosis of liver cells isolated in large areas was almost constantly found. Where there was no necrosis there were still changes in the liver cells at the periphery of the lobules, where they were swollen, with rounded edges and vacuolated protoplasm. Though especial emphasis has been laid on the liver, there is no doubt that analogous changes occur in the cells of other organs—kidneys, heart, etc. Autolysis will naturally occur in organs where ferments are most powerful and numerous. The liver is remarkably well equipped with these, especially proteolytic. Peptides, which resist the action of pancreatic juice, are attacked successfully by liver-extract (Matthes, Abderhalden).

If in eclampsia autolytic ferments are more active, what activates

them? Without speculating, for the present, on the primary cause of eclampsia, we know that the autolytic ferments of an organ are raised in activity principally by the addition of ferments from another organ (Jacoby) when the globulin of the blood is increased (Baer and Loeb), and if acids and other toxic products are allowed to act spontaneously.

Ferments themselves are highly toxic, not only on the cells which contain them, but on the body generally. Hildebrandt observed, after injection into animals of ferment solutions, a rise of temperature; thrombosis and hæmorrhages in various organs; increased coagulability of the blood from a rise of fibrinogen content; degenerations in the liver, kidneys and heart. The liver was the organ especially affected, and the degeneration of liver cells was proportional to the amount of ferment used.

What are the results produced by autolysis, during life of the cells of the liver and other organs? The result is the passage into the system of large quantities of toxic substances, products of protein disintegration. These have been already enumerated (see p. 269).

H. Mayer found that the injection of formic acid into animals produced drowsiness, convulsions and coma. Liver extract has a high toxicity (Mairet and Vires); it produces drowsiness, respiratory failure, convulsions and intravascular clotting. The physiological effect of injecting peptone and albumoses into the blood is increased coagulability and a fall of blood-pressure.

The result of the process does not merely cease with the passage of toxic bodies into the circulation. There are further sources of intoxication. These are:—

(1) The original promoter of the change. This has not yet come under discussion: it is probably ferments from the placenta (see Part III.).

(2) The toxic products (already discussed) formed from the cells of various organs.

(3) The disturbance in function of such an organ as the liver, which must be considerable when much of the parenchyma is destroyed. With an intact and functionating liver there would be much less chance of fatal intoxication from these toxic products. The liver deals with amino-acids and converts them into urea and its immediate precursors.

(4) The autolytic ferments are further activated by the presence of the amino-acids and other substances. An autolytic vicious circle is thus established.

The remaining outstanding feature of eclampsia is the extensive intravascular coagulation. Schmorl's original view was that thrombosis was primary and cell degeneration secondary: he often

noticed areas in the liver where there was thrombosis of capillaries, but no necrosis. He pointed out the similarity of the lesions of eclampsia to the lesions produced in animals by injecting various substances which cause intravascular coagulation, as in Wooldridge's well-known experiments (intravenous injection of extracts of thymus, testicle, etc.). On the analogy of these Schmorl himself injected animals with emulsions of placenta, and brought about death with extensive coagulation of the blood and other changes similar to eclampsia. He therefore concluded that eclampsia was an intoxication with substances, probably placental cells, which produced coagulation of the blood.

A more probable explanation is that the cell degeneration is primary and is not dependant on thrombosis of neighbouring capillaries. Either the thrombosis is consequent on the autolytic products of cells or both are dependant on the same agency. Konstantinowitsch discusses this point, and maintains that thrombosis is a later change than cell degeneration, as is indicated in Group I. of his cases. Nürnberg has shown that autolytic extracts of organs have a powerful coagulating action, especially liver extract. Further, the destruction of red corpuscles during life, such as is known to occur in eclampsia, is a powerful factor in causing intravascular clotting. The most probable explanation of the thrombosis and other blood changes in eclampsia is the gradual passage into the circulation of products of protein disintegration.

Dienst thinks that the increased amount of fibrinogen in the blood (as demonstrated by himself and others) can account for all the lesions of eclampsia. In considering the question of increased coagulability of the blood and thrombosis in eclampsia, his more recent work must be taken into account, though few people will agree either with his experiments or with his conclusions.

Dienst (1905) thinks that, in eclampsia, there is a passage of fœtal blood into the maternal circulation. The fœtal blood, behaving like the blood of another species, calls forth the production of various antibodies (lysins, agglutinins, precipitins) in the maternal blood. These are toxic and act chiefly in causing coagulation in the maternal capillaries; further, the agglutination of the fœtal red corpuscles causes minute thrombi, and the destruction of other fœtal corpuscles assists still further in raising the coagulability of the maternal blood. He found the maternal serum, in cases of eclampsia and albuminuria, agglutinated and hæmolysed fœtal red corpuscles. To demonstrate a connection between the fœtal and maternal circulations he injected milk into the umbilical vein. In 15 cases of eclampsia the milk flowed freely from the maternal surface. He tried the same experiment in 335 non-eclamptic placentas, and found that such a communication existed more often than was supposed, but in none did the milk escape at such a rapid rate as in the

eclamptic placentas. He further injected methylene blue into the umbilical vein, immediately after the birth of the child; in 20 per cent. of cases it appeared in the maternal urine. These experiments should not be taken too seriously, for there are many sources of error: the delicate capillaries of the villi are easily ruptured, and the maternal surface of the placenta is seldom intact after delivery.

Dienst (1908) has since had to alter his views, now it is known that eclampsia does not depend on the presence of a fœtus. He still looks on fibrinogen as the real cause, and now assigns the increased fibrinogen of the blood to breaking-down white corpuscles, which are much increased in eclampsia and which, he thinks, are destroyed in the placenta.

Acidosis and Eclampsia. The relation of acidosis to eclampsia will be found fully stated in a discussion, opened by Leathes, at the Pathological Section of the Royal Society of Medicine, 1908. The present position may be summarized as follows: By acidosis is meant a condition in which an abnormal quantity of organic acids escape oxidation and remain free in the body, where they may be detected in the blood and urine. Further, there is in the urine a diminished proportion of urea-nitrogen and an increased one of ammonia-nitrogen, because the free acids kidnap and utilise as a base the ammonia which would otherwise be converted into urea. In eclampsia there is, therefore, ample evidence that an acidosis is present. What significance has this?

Zweifel ascribes the high percentage of ammonia in the urine to lactic acid, which he regards as the cause of eclampsia. His views on this latter point do not stand on a firm basis, for (1) lactic acid has been repeatedly found in the urine of epileptics, in far greater proportion than Zweifel ever found it (Inouye and Saiki); and is further found in a large list of other affections, chiefly those associated with diminished oxidation and cyanosis, such as uræmia, pneumonia, leukæmia, CO_2 poisoning, cirrhosis of the liver. In epilepsy its presence is due to the severe muscular exertion and cyanosis accompanying the fits. (2) Lactic acid, apart from being an acid, is not toxic, and the injection of sodium lactate into the circulation of dogs, in far greater amount than ever found by Zweifel, caused no disturbance. So it is difficult to look upon lactic acid as a cause of profound intoxication. Zweifel, when critics pointed out that lactic acid was found in the blood and urine of epileptics, retorted that in eclampsia its presence could not be ascribed to the cyanosis and convulsions, because (1) he had found it in cases of pregnancy kidney without convulsions; (2) sometimes it was found in greater quantity in the fœtal than in the maternal blood, and (3) lactic acid is present, in some cases, before convulsions occur (see p. 272).

After all, the presence of lactic acid in eclampsia admits of a very ready explanation. Lactic acid can result from the disintegration of protein, and can probably be formed from the amino-acids, for there is a close relationship between lactic acid, alanin, cystin and phenylalanin. It is to be regarded, therefore, as one of the many disintegration products of protein, of which so many have been found in the tissues and secretions in eclampsia (Dryfuss). No doubt, after convulsions and cyanosis, there is a further increase of lactic acid from diminished oxidation. Lactic acid is therefore an effect and not the cause of eclampsia.

There are two other conditions which are characterized by a high ammonia co-efficient: they must be mentioned, because they are usually associated with eclampsia. They are (1) on a diet poor in nitrogen, when the total nitrogen intake of the food is low; (2) starvation and prolonged vomiting. In these, the excess of ammonia appears in the urine, because acids produced during metabolism, failing to find fixed alkalies to neutralise them (usually supplied by the salts of the food), are neutralized by ammonia that would otherwise be converted into urea: the condition is, therefore, due to a "shortage of fixed bases." In eclampsia, such an origin of increased ammonia co-efficient need not be considered; for it is well explained by the excess of acids, found so constantly in the blood and urine.

Another cause that may contribute to the high ammonia co-efficient is associated with the function of the liver in converting ammonia and the amino acids into urea. In eclampsia the destruction of the liver is often great and might reasonably be considered responsible for a grave disturbance of hepatic function. But there are certain facts against supposing that diseased liver tissue interferes much with the urea-forming function (for a discussion of these the reader is referred to Leathes' paper in *Trans. Roy. Soc. Med., Path. Sect.*, 1909). The evidence seems to prove, that in eclampsia, the high ammonia co-efficient is much more due to an increased formation of amino-acids than to a defective urea-forming function of the liver, to starvation and vomiting, or to cyanosis and convulsions.

To sum up then, there is evidence to show that the outstanding feature of eclampsia is an autointoxication of the body by the toxic products of protein disintegration. This is brought about by the autolysis of the cells of certain organs, especially the liver, by the abnormal activity of the intracellular ferments.

The foregoing account does not pretend to be a complete discussion of the various theories of the nature of eclampsia, but merely indicates the lines that are being followed in the light of recent research.

Part III.

The Placental Theory of Eclampsia: the possible primary cause.

The placental theory holds the field to-day. The fact that eclampsia is always associated with pregnancy, points naturally to the ovum as the primary origin of the disease. For a long time the fœtus itself was held responsible, by the passage of fœtal metabolic products into the maternal circulation This view was shaken when cases of eclampsia were described in which the fœtus had long been dead, and which developed only after the death of the fœtus. It received its final blow when Hitschmann recorded the first case of eclampsia in association with vesicular mole and absence of a fœtus (1904). Since then at least 5 other cases of eclampsia with vesicular mole have been described by Gross, Falk, Olshausen, Kroemer and Dienst.

The following considerations lend weight to the view that the placenta has a very intimate connection with eclampsia:—

(1) Eclampsia has been associated with vesicular mole. When one considers that eclampsia usually occurs in primigravidæ and in young women, and vesicular mole in multiparæ and in older women: further, that eclampsia nearly always occurs in the later months of pregnancy, and vesicular mole in the earliest months, it follows that the number of cases of eclampsia associated with vesicular mole is relatively great.

(2) The placenta has peculiar anatomical relations, for its whole surface is in contact with the maternal blood. Since the villi lie free in the maternal blood-spaces, the whole of the trophoblast, representing an enormous surface area, is bathed in maternal blood.

(3) The placenta is known to possess many powerful ferments.

(4) Chemical changes have been found in eclamptic placentas, suggesting increased ferment-activity.

(5) Experimental work, consisting in the injection of various preparations of normal or eclamptic placentas, have produced in animals conditions very similar to eclampsia.

(6) The anatomical changes in the villi of eclamptic placentas, though slight, are noteworthy.

(7) Free placental cells are often found in the maternal circulation: this suggests the possibility of cytolysis.

(8) Certain cases of eclampsia, *it has been said*, have only ceased post partum, after the removal of a piece of retained placenta.

Veit (1901) suggested that the presence of placental cells in the maternal circulation led to the formation of specific anti-bodies, which he termed syncytiolysins. Veit and Sholten (1902) published the following results: Pieces of fresh human placenta, deprived as

far as possible of all fœtal and maternal blood, were placed in the peritoneal cavity of rabbits: the urine of these animals, after 24 hours, contained albumin. Their serum was then taken and added to an emulsion of placental cells. By the microscope, the nuclei of these cells were seen to rapidly disappear, which showed in the serum the presence of some substance destructive to placental cells (syncytiolysin). The same serum was not hæmolytic to the blood of pregnant or non-pregnant women. Veit concludes that placental cells are toxic, and are destroyed in the maternal circulation by syncytiolysins: if, however, there is a sudden access of syncytium, more than can be dealt with by the syncytiolysins, albuminuria, and in severer cases, pregnancy kidney and eclampsia results.

Ascoli (1902) prepared two varieties of sera: (1) A hetero-syncytiolysin, made by treating rabbits with guinea-pigs' placenta, and (2) an iso-syncytiolysin, made by treating rabbits with rabbits' placenta. He found that injecting pregnant guinea-pigs intravenously and subcutaneously with heterolytic serum, produced no effect, beyond a transient albuminuria: pregnancy always continued to term and healthy young were born. On the other hand, the injection subdurally of very small doses (0·1—0·3 c.cm.) led to rapidly fatal results, for the animal immediately passed into a state of deep coma interrupted by tonic and clonic convulsions. With a smaller dose, the effect was less, and the animal recovered. Control experiments were made with normal sera, without effect. Heating the specific serum for 1 hour at 60°C., diminished its powers. Injection subcutaneously and intravenously of rabbits with isolytic serum had even less effect than the heterolytic; injection, also, of large doses subdurally had no effect, except in isolated cases. Ascoli asks if auto-syncytiolytic sera can be formed in the body, having the same action on the central nervous system, as these artificially-prepared sera. Although his theory is based on the same general principles as that of Veit, he differs in supposing that syncytiolysins and not placental cells, are the cause of eclampsia.

Weichardt (1902) accepts the same general principles as those of Ascoli and Veit, and agrees that syncytiolysins are formed both experimentally and in pregnancy. He differs as to the manner in which the poison is produced: his explanation is rather more complicated, for it introduces another substance—an antitoxin. When an autointoxication occurs, it is met by antibodies: if these fail or are feeble, the autointoxication has unlimited action, and it is this principle he considers so important in eclampsia. His theory may be stated thus:—

Placental cells + blood, &c. = syncytiolysin.
Syncytiolysin + placental cells = syncytiotoxin.
Syncytiotoxin + sufficient antibody = no result.
Syncytiotoxin + insufficient antibody = eclampsia.

He attempted to prove this by the following experiments:—

A syncytiolytic serum was prepared by injecting a rabbit with a suspension of fresh human placenta in salt solution. Its syncytiolytic power was tested and proved by examining a hanging|drop preparation of placental cells plus serum. The serum was also hæmolytic. A rabbit was injected subcutaneously with a mixture of 10 c.cm. of serum plus finely-ground placental cells. The mixture contained, therefore, the products of the destruction of the cells—syncytiotoxins (of the nature of endotoxins). The animal died with convulsions, and an examination of its organs revealed necrosis of cells, hæmorrhages, capillary thrombosis and fibrin deposition in the liver; and thrombi in the kidney and other parts of the body. Two other rabbits were injected, with similar results. There were *six negative results*, which Weichardt did not mind very much, for natural immunity to cellular toxins is very variable and cannot be gauged. In a similar series of experiments, in which, however, the serum was obtained from rabbits treated with the placenta of other rabbits, the results were negative. This may be explained by assuming the absence of power of forming iso-syncytiolysins. Weichardt points out the impossibility of producing eclampsia by the injection of placental cells alone, for the natural antibodies in the blood can deal with these. It is only when there is an excess of cytotoxins or a decrease of antitoxins, that eclampsia is produced. In his own experiments he used an excess of cytotoxins.

In 1906 Weichardt and Pilz undertook another research on similar lines, and again came to the conclusion that eclampsia is caused by endotoxins liberated by the cytolysis of placental cells, in women who have a deficiency of anti-endotoxins. They were able to immunize rabbits in the following way:—An emulsion of human placenta was injected into a rabbit; its serum, which possessed syncytiolytic properties, was mixed with a fresh emulsion of placenta; the mixture, which contained syncytial endotoxins, was injected into another rabbit in repeated small doses. The serum of the latter animal was able to protect other rabbits from the injection of comparatively large doses of syncytial endotoxins. Weichardt thus foresees a serum treatment for eclampsia.

So far then, there were three theories as to the placental nature of eclampsia:—

(1) Veit: due to the presence in the blood of placental elements, too numerous to be dealt with by the syncytiolysins.

(2) Ascoli: due to an excess of syncytiolysins.

(3) Weichardt: due to syncytiotoxins, which have been liberated from placental cells by syncytiolysins, and which are too numerous to be dealt with by the antitoxins.

Other workers soon appeared in the field; some agreed with the above theories, some disagreed, whilst others ventured new theories.

Liepmann (1902), contrary to Veit and Weichardt, could never obtain cytolysis of placental cells by means of specific sera. He found that if pieces of placenta were placed in a specific serum and left in an incubator for 24 hours, the protoplasm of the cells developed a cloudiness and a diminished staining affinity. But exactly the same appearances were produced by normal serum, and definite karyolsis never appeared. He, on the other hand, pointed out another phenomenon. He prepared a specific serum by injecting an emulsion of placental cells into the peritoneum of rabbits. The serum of these animals became turbid on the addition of fresh placental cells, due to the formation of preciptins in the serum. Thus, he showed that although the serum did not possess the specific properties ascribed to it by Veit and Weichardt, it nevertheless possessed another specific reaction—the formation of precipitins. He found also that the serum was, to a certain extent, hæmolytic, and gave a slight precipitin reaction on the addition of certain other varieties of cell. From a consideration, firstly, of the specific precipitin reaction of the serum on the addition of placental cells; and, secondly, that a certain amount of free cells are always present in the maternal circulation in pregnancy, Liepmann suggested that he had discovered a "serum test" for the diagnosis of pregnancy.

In 1903, Liepmann published further work. He chose for his experiments placentas which had been delivered by Schultze's method, and which therefore had been more or less protected from contamination with the maternal passages by the membranes. Separate cotyledons were cut out and placed in a sterile bowl with sterile salt solution. The pieces were next minced in an ordinary sterile mincing-machine, and were finally passed through a very fine sieve. The resulting fine emulsion was washed repeatedly in sterile salt solution until all blood had, as far as possible, been removed. A placenta usually yielded about 150 grms. of this fine emulsion: its sterility was tested by inoculation of culture-tubes. Rabbits were injected intraperitoneally with as thick a suspension as possible of the emulsion.

Contrary to Veit and others, Liepmann found that no ill-effects were produced, even with such a large dose as 64·5 grms. in 100 cc. of salt solution. Albuminuria appeared in two cases only out of 16. He considers this albuminuria is not specific, but purely physiological, comparable to that appearing after a liberal diet of eggs. He concludes that the healthy human placenta has no toxic action on animals.

Liepmann's hope that a specific serum test could be used to detect the presence of free placental elements in the circulation, and therefore of pregnancy, was realised. The specificity of the serum to be used was first tested with a suspension of placental emulsion; 0·2 c.cm. of specific serum + 1 c.cm. of normal saline solution gave

turbidity within five minutes of adding a measured quantity of placental emulsion. He found that the specific serum gave a precipitate with fœtal blood serum from the umbilical cord and with serum from the retroplacental blood. Negative results were given by the serum of men and of non-pregnant women. No mention is made of tests with the serum of pregnant women, which seems curious. In another short article, which appeared the same year, he writes that results of the practical application of the "serum test" will appear in a later paper. This paper has never appeared.

Opitz (1903) is in total disagreement with Liepmann. To begin with, he critizises Liepmann's technique in the preparation of the placental emulsion: the repeated mincing and washing with salt solution to get rid of the blood may have probably resulted in loss of much of the syncytium, and may have accounted for the fact that the animals injected did not show any appreciable ill-effects. Opitz used a different method. Directly after delivery the placenta was transfused for a long time through the umbilical arteries with salt solution, under a pressure of $1\frac{1}{2}$ metres of water. This procedure seemed best for freeing the placenta from fœtal blood. The superficial decidual layer was then shaved off, and the remaining placenta ground up in a mortar with sterile salt solution. Animals were injected intraperitoneally with the emulsion thus obtained.

Opitz failed utterly to obtain a distinctive precipitation on adding the serum of pregnant women to this specific serum. He did not expect the serum to be sharply specific, and points out that it must contain a variety of antibodies, for an emulsion of placenta consists not only of syncytium, but also of blood (both maternal and fœtal) and connective-tissue. But he expected to obtain a sharper reaction with pregnant than with other women. But he could detect no difference in the reaction given by the serum of pregnant women, of eclampsia, of non-pregnant women, of fœtuses and of men. Nor could he see any precipitation when emulsion of human placenta was added to the serum in pregnancy or eclampsia.

He, therefore, concludes that there is no such thing as a specific precipitin reaction, and that Liepmann's proposed "serum test" for the diagnosis of pregnancy is a myth.

Opitz immunized a goat, according to Weichardt's method (c.f.), and used the serum for the treatment of eclampsia. He gives no details of this, and says that, at present, no opinion can be given, for the number of cases was too small, but "the serum did no harm." He promises further reports on the manufacture of the serum and the results of its employment. But these have not yet appeared.

(To be continued.)

OBITUARY.

WILLIAM RIVERS POLLOCK, M.D., F.R.C.P.

Rivers Pollock started private practice as an obstetrician, and to the last his interests were centred in midwifery. His first appointment was to Queen Charlotte's Hospital, and at the time of his death he was Senior Physician to that institution. He quickly acquired a large private midwifery practice and greatly impressed his patients by the time and care which he bestowed on them. Later he was appointed to the post of Assistant Obstetric Physician at Westminster Hospital, and, at the time of his death, had been Senior Obstetric Physician for eight and a half years.

He was essentially a practical man, and took but little interest in matters purely theoretical. His experience in practical midwifery was very great, and his views, based on his own experience, were shrewd. Nature had gifted him with more than an average share of sound common sense, and he brought this to bear on his practice. He contributed little to medical literature, partly because he disliked self-advertisement, partly because he was very busy and enjoyed anything but robust health. He once remarked to the writer: "They keep worrying me to write something or to read a paper. I don't need to advertise myself, and an awful lot of rubbish appears in medical literature. When I have something worth writing about they shall have it." He thought he had something worth recording on the subject of external version in breech cases during the latter part of pregnancy, and he read a paper dealing with this before the Obstetrical Society quite recently The most novel feature of this paper was the recommendation to place the patient in the Trendelenburg or even in the vertical position under anæsthesia before attempting version, in order to disengage the breech of the fœtus from the pelvis.

He was a man of strong character who knew his own mind and had the courage of his convictions. His coolness and courage were always at their best when confronted by difficulty; he was never disconcerted when suddenly called upon to face some unexpected complication, and his resourcefulness and the dexterity of his manipulations were never seen to greater advantage than in the conduct of a difficult midwifery case.

As a teacher he was simple, and sought to impress the outstanding facts rather than to draw attention to a mass of detail. He believed in the short lecture illustrated by cases and anecdotes, and anyone who heard him tell a story never forgot it. Endowed with consider-

able histrionic power and an admirable mimic, he experienced no difficulty in keeping the attention of his hearers and in not only instructing but amusing them.

He was very popular as an Examiner, being kind, considerate and practical. At the time of his death he was Examiner for the Universities of Cambridge and London and for the Conjoint Board of the Royal Colleges in London. No friend was ever kinder or truer; he never ceased to be a boy and success never spoilt him or made him forget his old friends or lose his sympathy for less fortunate colleagues. His death will be an irreparable loss to very many who knew, respected and loved him. In the truest sense of the word he was an English gentleman.

G. D. R.

REVIEWS OF CURRENT LITERATURE.

Mental Alienation in Women and Abdomino-pelvic Disease.

W. P. MANTON (*Journ. Amer. Med. Assoc.*, vol. lii, p. 1069, 1909) has devoted twenty years to place on a sound basis the knowledge of the influence which pelvic and abdominal disorders might exert on the causation and progress of mental troubles in women. As a result of his labours it appears that to-day there is hardly an asylum of size in America where either a consulting gynæcologist or a member of the staff set apart for this duty may not be found. He states that his own investigations have shown that about 81 per cent. of insane women suffer from some form of pelvic or abdominal disorder. Two other observers, Hobbs and Isabella Davenport, report a percentage of 93. (It would be interesting if precise details of the pelvic and abdominal disorders found in these cases were given.)

Manton finds that insanity following eclampsia is so infrequent that eclampsia hardly deserves consideration as an etiological factor of insanity. Post-operative insanity appears to be fairly common. He considers that local disorders exclusive of septic or toxic conditions, are unable *per se* to give rise to mental derangement. But to a constitution already debased by alcoholism, syphilis, tuberculosis and the "strenuosities" of modern life the addition of abdominal or pelvic disease may result in a psychic overthrow. It is in these cases that the removal of the abdominal or pelvic trouble may be exceedingly beneficial to the patient if undertaken before the mental alienation has progressed too far. But whether a cure of the insanity is effected or not, it is certain that improvement in the mental condition is likely to supervene from the removal of the focus of irritation. C. NEPEAN LONGRIDGE.

Experimental and Clinical Researches on the Action of Sodium Formate on the Uterus.

CARLI (*Annali di Ostetrica*, July, 1909) reported to the Obstetrical Society of Genoa the result of 3 years experimental research and clinical observation on the action of sodium formate on the uterus. He instituted 3 series of experiments on 31 pregnant animals to ascertain (1) the degree of toxicity of the formate, (2) its abortive and (3) its ecbolic action. His clinical observations were conducted with the same ends in view, and since the value of such observations must depend on the number of statistical data, he had administered the drug to 232 patients, checking his results by comparison with 200 untreated cases. In all the cases there were no pelvic or other defects which might prove obstacles to the normal evolution of pregnancy. The conclusions which he draws from experiment and observation are: (i) The degree of toxicity of the drug is very low. Animals, especially dogs, tolerated large doses and recovered speedily from any depressing effects. Clinically, doses were naturally regulated to suit the patient, but gastric or other disturbances were not noted. (ii) It has no abortive action. Experimentally, there were only 3 cases of interrupted pregnancy, and these could not be directly traced to the drug. Clinically, fewer cases occurred in the patients under treatment than in the others. (iii) It has a remarkable ecbolic action. Injected into animals at or very near term it was seen that it easily excited powerful rhythmic contractions and that these were preceded and accompanied by vaso-dilatation of the uterine vessels. Injected regularly into women 1 to 3 months before term, it seemed to exert a beneficial effect on their general health, and to induce an easier and quicker delivery, uterine contractions appearing to be more frequent, energetic and efficacious than in other cases. As the time of the expulsive

period was shortened relatively more than that of the other two, it is probable that the toxicity of the abdominal muscles was increased more than the uterine, hence that the formate has a more stimulating effect on striped than on smooth muscle. Injected during labour in 79 cases of primary inertia, in 74 efficient contractions were excited in 15—20 minutes. Thus, though it cannot always supersede instrumental aid it may be substituted in some cases. (iv) Its vaso-dilating action is counterbalanced by the increased contractile power which it bestows on the fibro-muscular cells. Cases of hæmorrhage were fewer and slighter in the treated than in the untreated patients. (v) Its effect is more manifest in primiparæ than pluriparæ. It is possible that in the former hyperæmia of the uterus is greater than in the latter and renders it more sensible to contractile stimuli. This hypothesis finds support in Sakschke's researches on the activity of secretion in the mammary glands of primiparæ and pluriparæ. (vi) The weight and length of the infants were superior in the treated cases than in the untreated. The rate of infant mortality was the same in both.

J. H. F.

Narcosis in Obstetrics and Gynæcology.

At the XVI. International Congress at Budapest (*Zentralblatt für Gynäkologie*, 1909, No. 40) Krönig, Freiburg, insisted on the importance of the solution for lumbar anæsthesia being of the proper specific gravity at a temperature of 38°C. In 1,300 cases operated upon under stovain, there were no serious complications except in 3 cases, one of which was fatal, but there was headache in 29 per cent., and the method failed in 6.4 per cent. The addition of adrenalin was of no importance. Inhalation narcosis was to be preferred for small operations, lumbar anæsthesia for greater ones especially, in obstetrics, for Cæsarean section. Lumbar anæsthesia is not indicated in spontaneous labour since it annuls abdominal pressure. The narcotic for inhalation should be a mixture of vapours not merely a mixture of fluids; its action should be assisted by scopolamin and morphia subcutaneously and veronal internally. Induced drowsiness had been used in 2,000 labours: the labours were prolonged by half-an-hour or one hour, and the children's respiration was deficient (*oligopnœic*).

As to the effect of the scopolamin drowsiness on the child: Gauss (Freiburg) admitted that investigation made by him (in conjunction with Holzbach) proved that the secretions, and especially the urine, of children born during induced drowsiness contain scopolamin. The oligopnœa is characterized by some pallor and the children lie quite still with limbs which, though relaxed, respond normally to stimulation. After the first cry the child stops breathing altogether and its pulse-rate falls to between 100 and 70. The oligopnœa rapidly passes off. Induced drowsiness does not increase the number of still births nor the infantile mortality either during the early days or even the first year of life.

van Hoosen argued that when pregnant women had to be operated upon for independent reasons the induction of drowsiness with scopolamin and morphia did not interrupt pregnancy, or injure the child in any way.

Frigyesi reported that Gauss' method of induced drowsiness was frequently employed in the II. Frauenklinik at Budapest and was effectual except in 4 per cent of the cases.

In the discussion Zweifel, Sellheim, Szabo and Hofmeier all spoke in favour of lumbar anæsthesia, preferring, moreover, stovain on account of its more prolonged effect in spite of its relative danger.

J. J. M.

Irrigation and Drainage in Obstetric and Gynæcological Operations.

Horace G. Wetherill (*Journ. Amer. Med. Assoc.*, vol. liii, p. 1078, 1909) reports: In this paper the author discusses the generally accepted principles as regards drain-

age of the peritoneal cavity, but adds nothing new to our knowledge thereof. Turning to obstetrics he takes a logical and commonsense standpoint. "What is there," he asks, "about the obstetric art which makes the average man so impervious to incontrovertible proof?" This is aimed at what evidently seems to be a common practice in America, namely the use of intra-uterine douches after normal labour.

Intra-uterine drainage is, under some circumstances, a most important surgical detail, but is rarely employed logically or with a proper regard for the mechanical principles involved in the attainment of the ends sought. A gauze plug, or wick, does not meet the indications, since at the best of times the capillary action of gauze is incapable of carrying off any but the thinnest of fluids and the meshes of the gauze become choked. The principles of true drainage require that the drain shall be open and free, capable of conveying thick fluids such as pus, blood, or mucus, and of being flushed *in situ*. Such a drain the author devised some years ago: it is an ingenious device, made of a piece of rubber tubing; even with the help of a diagram it is not easy to comprehend it at once. Practically it comes to a double self-retaining tube which may be passed into the uterus and left there; irrigating fluids (33 per cent. alcohol is recommended) may then be admitted at a low pressure either continuously or intermittently. The author uses the same device for continuous irrigation of the bladder.

C. Nepean Longridge.

The Arrest of Hæmorrhage by means of the Whip Suture.

Chaput (*Revue de Gynécologie et de Chirurgie Abdominale*, September—October, 1909) describes a method of arresting hæmorrhage in the course of abdominal hysterectomy by means of the whip suture. The pedicle is caught transversely in pressure forceps applied close to the cut edge. The suture is then passed through the pedicle and around the blades of the forceps, thus whipping or overcasting the free border together with the forceps. The suture commences at the upper and ends of the lower border of the pedicle. The forceps having been withdrawn from the loop of the suture the two ends are tied together, the tissue within the ligature being bunched up into a blunt cone and the raw surface completely covered in. The author recommends that no more tissue than can be drawn together with from three to five loops should be included in one knot, otherwise some of the edge of the pedicle may be left exposed. To diminish the risk of puncture the needle should always be passed in a direction parallel to that of the vessels in the pedicle.

For some time past Chaput has employed this method exclusively for the arrest of hæmorrhage occurring during abdominal hsyterectomy and states that in no case has he been dissatisfied with the result. The suture causes the death of very little tissue, and therefore diminishes the risk of infection: it is easy to apply and takes no more time than simple ligature; it is impossible for it to slip, and it does not cut the tissues.

A. Lionel Smith.

Elephantiasis of the Vulva.

Nicholas (*Revue de Gynécologie et de Chirurgie Abdominale*, May—June, 1909) writes of an enormous tumour of the vulva weighing 14 kilogrammes. The patient, a multipara, aged 45, a native of the Loyalty Islands, had noticed a swelling of the left labium majus for some years, but the actual tumour had grown in about four years. When the patient was seated the huge tumour, hanging between the widely separated knees, just touched the floor; it was pyriform in shape and the largest measurement was 52 centimetres. The vaginal orifice was drawn to one side and about 3 centimetres of the left vaginal wall exposed externally. The orifice of the urethra was normally situated, but the clitoris was considerably displaced to the left. The epithelium of the lower part of the tumour was ulcerated owing to frequent contact with the ground.

The tumour was excised without difficulty and the patient discharged on the tenth day, cured.

As a rule elephantiasis of the female genitalia, due to the presence of the filaria sanguinis hominis does not attain anything like this size, though in the male the tumour is frequently larger. The rapidity of the growth of this tumour was remarkable, generally the growth is extremely slow and of many years' duration. This case confirms the author's opinion that the removal of elephantiases of the vulva is attended with very much less hæmorrhage than occurs during the removal of a similar tumour of the scrotum. A. Lionel Smith.

Vaginal Cysts.

Gache, in an article on vaginal cysts (*Travaux d'Obstétrique*, 1909), mentions the following theories which have been advanced at different times as to their origin. Dilatation of glands in the vaginal mucous membrane in cases where the cysts are small, multiple and scattered. Dilatation of an aberrant Bartholin gland may explain cysts low down in the vagina. Wolffian remains are said to explain large cysts, especially if they extend up into the base of the broad ligament. Imperforate accessory vagina [Müllerian origin]. Traumatic, by inclusion of portions of epithelium which subsequently proliferates. Separation of the lowest part of the pouch of Douglas during development comparable to the formation of the tunica vaginalis; and lastly, aberrant cervical and urethral glands have been thought to explain certain uncommon cysts.

The most usual position is high up in the vagina: 53 being in the posterior wall, 49 in the anterior wall and 19 in the lateral walls.

They are only multiple in 22 per cent. of cases, though 15 cysts are said to have been present in one case. Although mostly unilocular those which are obviously Wolffian may be multilocular. They rarely give trouble in labour, but Gache gives details of an interesting case where dystocia was twice caused by a cyst. A primipara was sent to the Rawson Hospital, Buenos Ayres, having been in labour four days; the head was still above the brim and a cyst could be felt between the rectum and vagina; it was punctured from the vagina and a litre of purulent fluid removed. The child was then delivered by forceps and both mother and child left the Hospital in good condition at the end of 10 days.

The same patient was seen when 6 months pregnant in December 1900, 300 grammes of liquid were removed from the cyst and 10 days later another 200 grammes. Easy natural labour took place in March—mother and child did well.

The patient refused radical treatment, which Gache thinks should not be attempted till after delivery. Clifford White.

Dilatation of the Cervix.

Curran Pope (*Journ. Amer. Med. Assoc.*, vol. lii, p. 1477, 1909) considers that the usual methods of dilatation of the cervix do not fulfil their purpose. He thinks that the fear of operation under an anæsthetic exercises a harmful influence upon the majority of patients, and that general anæsthesia should be avoided whenever possible. He claims that dilatation of the cervix may be effected efficiently by means of electrical currents. He uses both the galvanic and faradic current. A flexible electrode is introduced through the cervix and connected to the negative pole, and a large-sized pad attached to the positive pole is placed upon the abdomen. The current is then allowed to flow. The resolving influence of the negative electrolysis softens and breaks down any obstruction, after which one or two dilators may be passed. The average dose is 10 milli-ampères. While the galvanic current is flowing and with the dilator in the cervical canal, a high tension faradic current is turned on to the point of comfortable tolerance. Then gradual slow and inter-

mittent dilatation is practised, the dilators being turned so as to bring every part of the canal and internal os into contact with the instrument.

Very little pain is complained of, the most frequent complaint being a sense of weight or heaviness. Following the dilatation there is usually a free mucoid discharge lasting about a day. This method is especially advocated to overcome obstructions or stenosis in the canal associated with flexions and displacements. It is also useful in cases of dysmenorrhœa. C. NEPEAN LONGRIDGE.

Papillary Tuberculosis of the Portio Vaginalis.

KURT EVERLING (*Berliner klin. Wchns.*, 1909, No. 31) describes a case of apparently primary tuberculosis of the portio in a girl of 25. The villous appearance and friable nature of the tumour suggested the diagnosis of carcinoma and the total extirpation of the uterus, but the microscopical examination of an excised portion of the growth established its tuberculous nature and supravaginal amputation of the portio was considered sufficient. J. J. M.

The Endometrium and some of its variations.

WILLIAM S. GARDNER and EMIL NORAH (*Journ. Amer. Med. Assoc.*, vol. liii, p. 1155, 1909) report: An investigation was carried out upon a series of 50 cases in which an accurate record of the menstrual history was available. It was found that at the height of the menstrual flow the endometrium diminishes in thickness and the glands pour out their secretion, becoming narrow and straight. The surface epithelium is frequently lost, but this is not an invariable rule. After the period a very rapid cell growth takes place in both the epithelium and the connective tissue. The glands become larger and wider, although still quite narrow and straight. By about the fifteenth day the cell growth of the epithelium has progressed to such an extent that the glands become somewhat tortuous and often assume a special appearance. Finally, six or seven days before the beginning of menstruation, the glands rapidly enlarge, and the cells bulge into the lumen, which is filled with a mucous secretion. These gland changes are more marked in the deeper portion of the mucosa than in the superficial, so that one finds a well-marked differentiation into a superficial compact, and a deep spongy layer.

In many cases the stroma cells assume an appearance so like that of decidual cells that there is no possibility of distinguishing between them. When one considers that the decidual cell of pregnancy, according to the generally accepted opinion of the present day, is merely the overgrown stroma cell of the endometrium, such findings can scarcely be wondered at. It is, moreover, quite probable, in view of recent findings, that the stroma changes, as well as the gland changes, may be brought about by various conditions other than normal menstruation, such as inflammatory disease, displacement, tumours and tuberculosis. As in the decidua of pregnancy, the stroma changes of menstruation are seen most conspicuously in the superficial compact layer of the endometrium, these changes being just as characteristic of the premenstrual period as are the glandular phenomena described above.

These observations throw a new light on the question of membranous dysmenorrhœa. In two cases microscopic examination of the membrane expelled from the uterus showed the presence of characteristic decidual cells, even though in the light of the clinical history there was little or no possibility of pregnancy. Knowledge of these histological changes has an important bearing upon the diagnostic importance of the decidual cell as evidence of pregnancy.

The authors conclude that the actual underlying cause of menstruation is the secretory activity of the ovary, which produces an internal secretion or hormone essential for its occurrence. The principal effect of this substance seems to be of a vasomotor nature and acts especially on the pelvic blood-vessels. It is only

natural to suppose that the endometrium plays a purely passive rôle in this phenomenon, and that the histological changes observed in connection with menstruation represent merely the reaction of the endometrium to the process—a reaction which may, however, be elicited by other influences than that of normal menstruation.

C. Nepean Longridge.

Sterility from Infantilism: its Pathology and Treatment.

Dr. Hans Bab, Berlin (*Volkmann's Samml.*, 538—540), devotes a triple number of over 100 pages to the exposition of sterility in women, resulting from an undeveloped condition of the genital organs. The importance of the subject must be admitted even if we do not accept the statement by Bumm that infantilism is the cause of sterility in two-thirds of the women who are unfruitful. Among the causes are degeneration of the parents from alcoholism or other depressing factors: whether premature birth is a cause or not there is not at present evidence to show, but insufficient feeding and severe diseases in early life hinder growth of the genital organs. Disturbance of the inner secretion of other organs such as thymus, pancreas, hypophyses, thyroid and adrenals, is associated with infantilism: many pages of references are devoted to this relation. Infantilism is much more common in the genitalia of women than of man and Bab is ungallant enough to suggest that this is because woman is on the border line between child and man.

In the ovaries of a pregnant woman most of the follicles do not ripen and burst: is atresia of the follicle a cause of sterility? Is the tunica albuginea of the ill-developed ovary too tough for the ovum to make its way out? For ovarian insufficiency ovarian substance is recommended and the source from which this can be obtained is discussed as is also the transplantation of an ovary: this last may be done also in cases of *climacterium precox*.

It is not known whether an infantile situation of ovaries and tubes can hinder the passage of ova downwards, but judging from the analogy of the undescended testicle it is probably so. The fimbriated extremity of the tube, the musculature and the ciliated epithelium, all contribute to the passage of the ovum and depend for their efficiency on a due blood supply, and this last is affected in infantilism. A discussion on the peristalsis follows, and on its excitation by the presence of spermatic fluid and by artificial irrigation with saline solutions.

The characteristics of the infantile uterus are described, and their causation, deficient ligaments and so on, their association with infantile pelvis, with upward displacement and flexion-versions. Acute retroversion is associated with sterility, probably because the portio vaginalis cannot dip into the pool of sperm fluid as it should. The lack of erectility of the infantile cervix is considered as also the smallness of the os externum: before deciding to operate the practitioner should examine the inside of the cervical canal as soon as possible post coitum, to ascertain the presence or absence of spermatozoa.

Artificial impregnation is suggested, and for choice direct injections of semen into the peritoneal cavity in the neighbourhood of the ovaries, as this method has proved successful in lower animals. As the infantile uterus is often associated with infantile ovaries, treatment by ovarian therapy is indicated in some cases of deficient or painful menstruation, but must at once be stopped if the results are not good. In all cases of early ill-development prophylaxis is indicated—good feeding, etc., as also to ward off lactation atrophy. The circulation can be aided by some form of Bier's hyperæmia treatment. A long list of emenagogues is given, and the use of Yohimbin is dwelt on: this last is contra-indicated by the presence of hæmorrhoids or any serious disease such as tuberculosis. The dose recommended is 5 milligrams thrice daily—say $^1/_{12}$ grain: this may be combined with Oophorin and Lecithin, but

the expense is high. This method of treatment is indicated also in frigidity and in those cases where the semen is ejected from the vagina. The paper closes with some pages drawing special attention to the new methods mentioned. E. H. L. O.

Uterine Prolapse.

E. T. Thring (*Australasian Med. Gazette*, August 1909) urges appropriate treatment in all cases of prolapse and retrodislocation of the uterus. He considers that vaginal operations alone are practically useless and that some method of shortening the round ligaments is the most effective treatment of prolapse.

In young patients in the child-bearing age he advises the Alexander operation of shortening the round ligaments in the inguinal canal. In patients after the menopause he strongly urges abdominal section and shortening of the round ligaments after the method described by Richardson in the *British Medical Journal* four years ago.

He bases his argument on the fact that in younger patients the round ligaments possess resiliency, and by bracing them up the desired effect on the uterus is permanently and efficiently obtained without the dangerous after-results of fixation operations. In later life these dangers no longer exist, and owing to the atrophy of and the loss of resiliency in the round ligaments some fixation operation should be substituted. J. A. W.

A case of Inversion of the Uterus of two years and four months duration cured by operation.

E. Sealy (*Amer. Journ. Obstet.*, August 1909) records a case of this rare condition and the means whereby he successfully replaced the inverted organ. Proceeding on the lines suggested by Piccoli in 1901, he drew down the posterior edge of the cervical ring and made a median incision therein. Taxis then failed, and the incision was continued up to the posterior reflection of peritoneum. Taxis failed again, making it plain that the obstruction to replacement lay in the entire uterine wall and not in the cervical ring alone.

The posterior vaginal vault was therefore incised, the peritoneal opening enlarged with the fingers, and an iodoform gauze plug placed in the *cul-de-sac*. A finger was next introduced into the uterus through the posterior incision and the posterior uterine wall divided to the fundus. Replacement was then easily effected. The uterus was then sewn with two layers of catgut and returned through the posterior *cul-de-sac* into the abdominal cavity. Next the cervical incision was closed and uterus and posterior *cul-de-sac* drained with gauze. Shock was slight and hæmorrhage not excessive. The patient made a good recovery and menstruation has since been normal. J. B. B.

Fibroid Tumour of the Uterus.

J. A. T. Hamilton (*Australasian Med. Gazette*, August 1909) considers the time has now come for reconsidering the treatment of uterine fibroids. The old view that these tumours were to all interests and purposes harmless and rarely threatened life is no longer tenable. From a study of the series of cases published by Noble, Kelly, Bland Sutton and others, it appears that in 14 per cent. of these tumours life is directly menaced. Further, the older the patient the more likely are dangerous degenerations and extra-uterine complications to arise; hence the futility of waiting for the menopause. Indeed, Noble has come to the conclusion that 25 per cent. of women afflicted with fibroid tumours of the uterus would die of some complication or degeneration of the tumour unless subjected to operation. Contrast this with the operation mortality rate which certainly does not exceed 10 per cent., and in skilled hands is very much lower.

The author, as a result of his own experience, and from a study of the views published by others, has come to the following conclusions :—

1. That a large proportion of fibroids undergo some form of degeneration, and that more than half such degenerations take place at or after the age of 40.

2. That fibroid tumours and visceral degenerations are found associated in a large number of cases.

3. That young women who are anxious for maternity, and who possess small symptomless tumours need not be subjected to operation. The dangers that these tumours cause to pregnancy and labour should be remembered, and the patients should be warned of them and advised to present themselves for examination from time to time.

4. That all fibroids producing symptoms regardless of the age of the patient should be removed. If the patients' age is 40 or over the fibroid should be removed whether it is causing symptoms or not, as the danger of keeping the fibroid is greater than the risk of operation.

5. That the present mortality rate for hysterectomy can be considerably lowered if the operation is performed earlier, before the degenerations and visceral complications accompanying fibroid tumours have had time to lower the patient's vitality or to make the operation prolonged and difficult.

The author considers that the supra-vaginal hysterectomy is the operation of election because of the ease and rapidity of its performance, and of its low mortality. It should be performed in all cases where a myomectomy is not possible and where a panhysterectomy is not demanded. J. A. W.

Radio-therapy of Fibromata.

At the XVI. International Congress of Medicine.

Foveau de Courmelles (Paris), in patients who do not wish to be operated upon, had been led to try the effect of the X-rays on fibromata, owing to their ascertained influence on certain cancers, and to fibromata in many cases becoming malignant. He had reported to the Paris Academy of Science the good results he had obtained in diminishing the size of the tumours and the suppression of hæmorrhage. Similar results had been obtained by Deutsch, Görl, Fränkel and Margaret Cleaves, and the improvement obtained in about 100 cases had led him to prefer radiotherapy to electricity. J. J. M.

The later results of the extended abdominal operation for Uterine Cancer.

At the XVI. International Congress of Medicine.

E. Wertheim (Vienna) said he had operated by his method upon 487 cases, on 200 more than five years ago. In these 200 cases a mortality of 24·5 per cent. was faced by absolute cure in 19·3 per cent. In the last 200 operations the mortality had fallen to 10 per cent., though the operability had risen to 60 per cent., and Wertheim hoped for absolute cure in 30 per cent.

In proof of the accuracy of his statistics he mentioned that not a single case had been lost sight of. Cases lost sight of must be taken as recurrent, and no deaths may be excluded as due to intercurrent causes save those in which an autopsy has proved that no recurrence has taken place. The advantages of the abdominal method do not lie so much in the possibility of removing the glands as in the greater accessibility of the parametrium and of the organs adherent about the uterus.

v. Ott, St. Petersburg, made out a strong case for simple vaginal hysterectomy by comparing his own results with those of Wertheim, Staude and Schauta; he held that in radical operations for uterine cancer the most important thing was to remove as much of the pelvic connective tissue as possible, and next, but subordinate to this,

the removal of the glands. The first aim should be to lower the primary mortality, the next to increase the number of permanent cures. Each method of operation has its advantages and disadvantages. The choice should depend on the conditions of each individual case; for cancer of the corpus simple vaginal hysterectomy was best.

DIRNER, Budapest, with an operability of 63 per cent. among 80 cases of abdominal radical operation, had had 15 deaths. During the same time he had only operated 11 times by the vagina.

WINTER, Königsberg, thought that owing to the high mortality of the abdominal radical operation, all methods, even simple vaginal hysterectomy, should be considered.

ZWEIFEL, Leipzig, attached much importance to the glands, and was therefore a supporter of the abdominal operation. Recurrences took place without affection of the vagina. The prognosis in women under 30 years of age was most unfavourable.

The permanent results of the extended vaginal operation for Cervical Cancer.

F. SCHAUTA, Vienna, after referring to his monograph (*ante*, September 1908, p. 233), insisted that in regard to technique it was sufficient to make one paravaginal incision, and that not till after the circular division of the vagina and the stitching of the cuff over the portio. The question of operability was not affected by cystoscopy. In 336 cases, the operability had been 47·7 per cent., with a mortality of 10·7 per cent. and accidental injuries in 10·4 per cent. The permanent cures after five years were 39·5 per cent., the absolute percentage of cures for five years (Winter II.) 13·4 per cent.

In six theses he compared the vaginal and abdominal methods of operating: the first three aimed at showing that it is not necessary to remove the glands. The others that the vagina, the rectum, and the bladder are more easily approached by the vaginal way and that the field of operation is rendered much more accessible by the paravaginal incision. J. J. M.

A case of Chorionepithelioma.

R. H. MARTIN (*Australasian med. Gazette*, January 1909) publishes an interesting case of this disease. The patient was æt. 35, had had four labours, the last 4 years previously, and one miscarriage. She missed her period in June, and in July was seized with sudden abdominal pain and some uterine hæmorrhage. On examination a swelling about the size of a turkey's egg was found behind and to the left of the uterus. From the history and physical signs a diagnosis of tubal gestation was made. After lightly curetting the interior of the uterus the abdomen was opened and a dermoid cyst of the left ovary removed. The right appendages were healthy. The curettings proved to consist of chorionic villi. In August the bleeding recurred with two rather severe floodings accompanied by a good deal of pain, and the discharge became offensive.

The interior of the uterus was again explored and was accompanied by free hæmorrhage. The tissue removed from the uterus was examined microscopically and found to be typical of chorionepithelioma. The patient was now in a critical condition, emaciated, with a continuous offensive blood-stained discharge, and fever rising at times to 104°F. Panhysterectomy, being deemed the only chance for the patient, was performed in September, from which she made a satisfactory recovery. At the operation the right ovary, which nine weeks previously had been seen to be healthy, was now considerably enlarged and cystic, but no microscopical examination of it was apparently made. Three nodules of chorionepithelioma were found in the interior of the uterus. J. A. W.

Torsion of Pedicle of an Ovarian Cystoma in a young girl.

M. Bornstein (*Journ. Amer. Med. Assoc.*, vol. liii, p. 1102, 1909) reports: A child, aged 13, had never menstruated, but for three months past had complained of periodic attacks of pain, usually at the end of each month, starting in the right knee and affecting the thigh and groin of the same side. She was seen in the fourth attack to which was added a sharp pain in the right iliac region, with fever and vomiting. There was no tenderness on palpation, but as the abdomen became distended, the vomiting continued and the pulse became rapid and feeble, operation was undertaken. A large cystic mass, the size of a man's head, was found springing from the right side of the pelvis. The pedicle was completely twisted. The case was mistaken for one of acute appendicitis before operation. C. Nepean Longridge.

A case of a typical Teratoma of the Ovary.

R. T. Frank (*Amer. Journ. Obstet.*, September 1909) reports a case of ovarian tumour from a patient aged 22, married 8 months, and never pregnant. She only complained of backache and leucorrhœa, and had no thyroid enlargement. One year and four months after operation the patient was in perfect health.

The tumour was ovarian in shape, of irregular, bossed appearance, and enclosed in the thickened tunica albuginea. At one pole a hard bony shell was noted. On cross section it was composed of irregular, somewhat angular cysts of greatly varying size, filled with a colloid material. Dissection of the bony portion revealed a molar tooth imbedded in the tissues and connected with a hard, bony lamella. At the opposite pole was a dense hæmorrhagic area.

Microscopically the latter proved to be a corpus luteum with hæmorrhagic infiltration. The hard shell was composed of normal bone, showing Haversian canals. The remainder of the tumour consisted of tissue identical with that of a colloid goitre. In some parts dense masses of thyroid acini of normal size were closely crowded, the lumen shewing but small accumulation of colloid. In a few spots a slight tendency to atypical adenomatous growth prevailed. No test for iodine could be made on account of the method of preservation. J. B. B.

Ovarian Abscess containing a Lumbricoid Worm.

Henry D. Fry (*Journ. Amer. Med. Assoc.*, vol. liii, p. 1028, 1909) records: A coloured primipara, aged 23, was taken ill suddenly with pain in the lower part of the abdomen and vomiting. The temperature and pulse were raised and the patient presented all the classical signs of acute abdominal disease. Vaginal examination revealed the presence of a double salpingitis. She vomited a lumbricoid worm, and the fæces contained numerous ova of the ascaris lumbricoides. The patient was kept under observation until the acute symptoms had subsided, when operation was undertaken. The left ovary was enlarged to the size of a hen's egg, the surface being smooth: on enucleating the wall of the sac ruptured and a small, dead, lumbricoid worm was found in the abscess cavity. The patient recovered. A list of cases in which the genito-urinary tract was invaded by the ascaris lumbricoides is given. C. Nepean Longridge.

The Significance of the Ovaries.

Bucura, Vienna (*Volkmann's Samml.*, Nos. 513, 514), devotes nearly forty pages to showing that very little is known of the functions of the ovaries. We know, he says, that the ova are formed in the ovaries, that the ovaries are essential to menstruation, that their removal leads to atrophy of the other genital organs and causes vasomotor disturbances. Everything else is more or less hypothesis; the results of ovarian transplantation can apparently be explained only by an "internal secretion" which no

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one doubts : he prefers to call this an "internal function" for we know nothing about it, neither whence it comes nor how it acts. In spite of the agnostic conclusions the paper contains much information about the ovaries and their functions

In the first section, devoted to internal secretion, Bucura relates various experimental researches. The ordinary atrophy of the genital organs following oöphorectomy can be prevented by the implantation even in another part of the body of the removed ovary, or of an ovary from another animal of the same species, or even another species, as, for example, the implantation of a guinea pig's ovary on a castrated rabbit. The results of the administration of ovarian extracts, to relieve the vasomotor disturbances in women after oöphorectomy, are inconstant, but that proves nothing; possibly the ovaries should be removed from animals only at the time of their heat. The ovaries have the three functions mentioned above, but their removal, though causing much disturbance, does not cause death as in the case of the suprarenal bodies or the thyroid. Probably also, as we shall see later, the ovaries maintain sexual desire. Researches on the nature and provenance of this internal secretion have given contradictory results.

Sex characteristics are next discussed and their relation to the ovaries. These are divided into primary (genital organs), and secondary, which again are of varying importance, such as man's voice and beard or the courting dress of animals, which are not of so great importance as the differences in the bones, especially of the pelvis, nor as the psychic differences noticeable even in childhood; of still less importance are those differences which vary largely in individuals. Unfortunately there are no unexceptionable details relating to the effects of removal of the ovaries in childhood such as we have of castration in the male. This last seems to affect only the voice and beard though eunuchs usually are taller than they would probably otherwise have been. It will be noticed that some of the secondary characteristics (skeleton, etc.) have begun to appear long before the ovaries are fully developed, or at any rate before puberty. The sexual phenomena of puberty and of the climacterium are mere symptoms and not causes of these periods.

Sexual instinct or desire (*Geschlechtstrieb*) is closely connected with the secondary sex characteristics. In the lower animals the loss of the ovaries always leads to loss of sexual appetite, and in cows this loss can be obtained by crushing the ovaries *per vaginam*. Castrated hares never permitted the approach of the male in Bucura's experiments, but he observed after implantation of an ovary in such an animal that he could predicate absolutely that the implantation was successful if the animal copulated : histological examination never failed to prove the result. The same result was obtained after implanting a guinea pig's ovary in a hare. In the human subject, on the contrary, removal of the ovaries does not as a rule cause loss of sexual appetite. Bucura explains this by suggesting that in the human subject psychic forces are of more importance than mere reflex excitation. It follows that removal of the ovaries is of no therapeutic value in cases of nymphomania.

As regards the determination of sex we are not beyond the region of mere guessing. Neither the ovaries nor testicles, right and left, produce only one sex respectively; nor again can external conditions influence the sex, such as feeding, and so on. Pflüger has shown that frogs taken from different places and having their ova fertilized artificially in a tank produced sexes in varying ratios among the three, but in the same ratio as with the same frogs in their natural habitats. Many animals lay their eggs before impregnation, so in them at least the mother can have no influence in determining the sex during incubation. Again, further, Heape's experiment showed that after impregnation, the mother does not affect the grosser characteristics of the fœtus. He took fertilized ova of an Angora rabbit about 36 hours after copulation with an Angora and implanted them in the Fallopian tube of a Belgian rabbit 3 hours after copulation with a Belgian : two of these developed as

Angora rabbits. Bucura provisionally accepts the hypothesis that the sex is determined in the unimpregnated ovum, basing his opinion on the analogy of some insects and other animals. Korschelt has shown that the male Dinophilus apatris is only ·04 mm. long while the female is 1·2 mm. and her eggs are of two sorts, large and small, which are fertilized before they are laid. Korschelt separated these and was enabled to demonstrate that the large eggs produced females and the small ones males. Loebs also was enabled to fertilize the ova of the sea urchin arabacia and thus produce a parthenogenesis by adding magnesium chloride to the sea water.

Bucura denies the existence of true hermaphroditism in man; that is, there is no undoubted case on record of an individual with glands capable of producing spermatozoa and ova. The pseudo-hermaphrodite is either a man or a woman with malformations in some of the secondary characteristics.

The influence of ovariotomy on osteomalacia is also discussed: the causation of this disease is still in the hypothetical stage; Fehling thought the reflex action of the ovaries was exaggerated and caused congestion of the bones; Kehrer believed the internal secretion, which normally acts as a solvent on bones (hence the smaller bones of a woman), was increased and chemically washed out the lime salts. No constant change has been found in the ovaries of women suffering from this disease. Removal of the ovaries often, though not always, arrests the disease. Bucura describes a woman whom he examined 17 years after operation: her pains had disappeared immediately after the operation but there had been a progressive deformation of all the bones. It seems probable, from the observations of Hanau, that osteomalacia occurring during pregnancy affects the bones of the pelvis specially. Where it occurs outside of the pregnant state, and it has been seen in virgins and in men, it affects the bones generally. Whatever may be the hypothetical value of these observations, and they seem to throw no light on the causation, castration remains the surest remedy and should be performed whether the ovaries are believed to be the direct cause or not. A full bibliography is added. E. H. L. O.

Transplantation of the Ovaries.

Cramer (*Gynæcologische Rundschau*, Jahrg. iii, Heft 16).—After reviewing the literature of the subject and discussing the advantages of different sites for transplantation, Cramer records the case of a woman, æt. 28, in whom he removed both adnexæ and the vermiform appendix, and implanted the left ovary in a pocket between the uterus and bladder. In three other cases the implantation was intraperitoneal.

Menstruation, which had formerly disappeared, has returned, and in one case where menstruation had not been present owing to congenital non-development of uterus and tubes, the implantation of the ovary brought on menstruation 8 times in 14 months, and the uterus and mammæ increased in size.

He has performed 21 transplantations in the human subject.

E. Scott Carmichael.

A Para-appendicular Pseudo-cyst of the Broad Ligament.

Froget (*Revue de Gynécologie et de Chirurgie Abdominale*, July—August 1909) writes of a case of appendicitis complicated by a cyst of the broad ligament. The patient, a woman 18 years of age, had suffered from several attacks of appendicitis. After the abdomen had been opened, the right iliac fossa was found occupied by a cyst of the right broad ligament which was adherent to the inflamed appendix, the cæcum, the right ovary and Fallopian tube. The cyst was dissected out and removed, together with the appendix, the tube and ovary: unfortunately, during its removal it ruptured, and about a litre of fluid escaped. The cavity was packed with gauze. The patient made a good recovery. At the time of the operation the tumour was

thought to be a parovarian cyst, but subsequent microscopical examination showed that this was not so. The tumour consisted of homogeneous fibrous tissue containing lacunæ of various sizes. At the periphery of the tumour the tissue was obviously inflammatory.

The cyst cavities were lined with a layer of connective tissue cells which were degenerating and stained badly. At no part of the section were any epithelial cells discovered. The ovary was normal. The Fallopian tube was thickened and the lumen dilated. The cyst probably originated by the formation and distension of lacunæ in the connective tissue of the broad ligament, the existence of the appendicitis being merely a coincidence, though the rapid growth of the tumour may have been due to the spread of the inflammation from the appendix to the cyst wall.

A. Lionel Smith.

Primary Cancer of Fallopian Tube.

Schauenstein (*Mitteilungen des Vereines der Aerzte in Steiermark*, No. 2, 1908) reports a case in the hospital practice of Professor Knauer, of Graz, Styria. The patient was a sterile woman aged 42. She had never been subject to any kind of illness until three months before admission into hospital. Then irregular hæmorrhages set in, which surprised her, as she had previously been perfectly regular. A hypogastric tumour was detected by her doctor. There was neither pain nor any mucous or watery discharge. The tumour was firm, smooth, and partly movable, it rose well above the pubes and descended far down into the pelvis below the uterus, where it was found to fluctuate. Ovarian cyst was diagnosed. The operation proved difficult on account of free adhesions to the omentum, and still more because the tumour burrowed deeply under the pelvic peritoneum. The uterus and both appendages were removed. There was a hydrosalpinx of the left tube, the muscle of which was atrophied, whilst the left ovary was normal, as was also its fellow on the right side. The right Fallopian tube was cystic and distended to the size of a fist in its outer third. Its middle third was considerably dilated and the mucosa bore a well-marked adeno-carcinomatous growth, partly papillomatous. Much broken-down and partly necrotic tissue had escaped from the middle segment of the tube into the big cystic cavity representing the outer segment. Schauenstein found that the mucosa and the remaining coats of the cyst were free from cancer. The uterus was healthy throughout and the operator carefully searched the pelvic and abdominal cavity for enlarged glands, but found no evidence of extension of the disease beyond the right tube. The patient recovered but was lost sight of after her discharge from hospital.

Alban Doran.

Primary Cancer or Deciduoma of the Fallopian Tube?

Mériel (*Revue Mensuelle de Gynéc. d'Obstét. et de Pédiatr.*, September 1908), in an article entitled *Epithélioma papillaire ou déciduome de la trompe?* describes a case where a primary tubal cancer was so bulky and vascular as to simulate a deciduoma, although the clinical history did not favour the view that it could have arisen from a product of conception. For the patient was not only a multipara aged 41, but she had ceased to menstruate when only 25 years of age. She had an acute attack of pelvic pain ten months before the tumour was removed and there were some more attacks followed by the expulsion of clots. A hypogastric tumour developed, lying to the right of the uterus. Chalot, of Toulouse, took away the uterus with both appendages. The operation was difficult, as a cavity full of pus was opened and then another containing liquid blood and a fleshy, malignant-looking mass, resembling a uterine deciduoma. The cavities proved to be cysts, and the separation of their walls from adhesions could not be effected without rupture. The uterus and the left appendages were free from any disease. The right ovary formed

a non-malignant suppurating cyst. The right tube constituted the second cyst; when laid open the malignant growth, which sprang from its mucosa, was in area "as wide as the palm of the hand." Professor Hermann, of the Faculty of Medicine of Toulouse, examined the growth and found that it was not a deciduoma, but a papillomatous epithelioma. The patient was examined six months after the operation and no signs of recurrence could be discovered. Eight months later she died from the effects of a carriage-accident.

[Risel "Zur Kenntniss der primären Chorionepithelioms der Tube," *Zeitschr. f. Geb. u. Gyn.*, vol. lvi, 1905, p. 154, reports eleven cases of alleged deciduoma of the tube, including one, undoubtedly genuine, in his own practice.—*Rep.*]

ALBAN DORAN.

Lymphangioma of the Fallopian Tube.

FRANZ (*Zentralbl. für Gynäk.*, No. 34, 1909) exhibited a specimen of lymphangioma of the tube at the March meeting of the Obstetrical and Gynæcological Society of Vienna. The patient, aged 53, was the victim of excessive corpulence, fatty heart, and loss of muscular tone, the abdomen was very pendulous and there was distressing eczema intertrigo. She had been married for 35 years and never been pregnant, the menopause occurred at the age of 49, the periods had been regular, but attended with spasmodic pains when she was young. For a year, irregular hæmorrhages had occurred, the cervix uteri was found free from cancer but the corpulence of the patient did not allow of palpation. Vaginal hysterectomy was performed and the patient recovered. The left tube was removed with the uterus as it bore a small tumour. The uterus was the seat of adenocarcinoma, the growth filling its cavity, and a myoma of the size of half a walnut sprang from its right side opening up the broad ligament. The left Fallopian tube was the seat of a swelling of the size of a cherry, which sprang from its ampullary portion and caused narrowing of the canal, which appeared semilunar on section. The cut surface of the tumour was homogeneous, white, and lardaceous. It was carefully examined under the microscope and was found to be made up of a thick network of lymph capillaries with but a scanty trace of connective tissue. There were collections of lymphocytes in the periphery of the tumour, probably representing extravasation from the vessels. The serous coat of the tube over the tumour was free, but the muscular coat was invaded and the mucosa seemed intimately connected with the new-growth, cubical epithelium being blended with cells of endothelial type undergoing proliferation.

Franz finds three earlier reports of lymphangioma of the Fallopian tube, described by Hoehne, Dienst and Kermauer. In all, as in his own case, the tumour was small and situated in the ampullary portion of the tube, and was associated with fibroid disease of the uterus. Franz's patient was the subject of adenocarcinoma of the uterus as well; the author lays stress in the endothelial proliferation, which was detected deep in the substance of the tubal tumour as well as near the mucosa, holding it to be evidence of malignancy.

ALBAN DORAN.

The Mechanism of Occlusion of the Fallopian Tube.

E. RIES (*Amer. Journ. Obstet.*, August 1909), after describing two specimens, gives his conception of the mechanism of occlusion as follows:—

He considers it impossible to differentiate between a perimetritic and a salpingitic closing and states that there is no perisalpingitis without salpingitis and no cases of salpingitis which do not at some time or other—if the patient lives—produce perisalpingitis.

The infectious contents of an inflamed tube escape through the abdominal end, and here therefore are the oldest changes in the peritoneum. There is chronic thickening of the serous coat, making a peritonitic ring out of a peritoneal one,

which ring, after the manner of all peritonitic scars on hollow organs, tends to contract. The escape of fluid from the tube is thereby impeded, the swollen folds have not enough room, and the tube dilates, its wall becoming stretched. The fibrous cicatricial ring dilates less than any other part, therefore the muscular and serous coats stretch more than the ring round the ostium. With the subsidence of inflammation the contents of the tube are absorbed or discharged, and the tube walls, as the swollen folds subside, become too large and loose. The peritonitic ring now gains in mobility and can contract further over the fimbriæ. These fimbriæ, being covered by epithelium, cannot adhere to the peritonitic ring and escape inward without inversion. The ring can now close completely and an occluded tube results.

The union being sero-serous is not very firm when recent, so that, by squeezing it, it can be forced open and the fimbriæ seen within, as described by Doran.

The varying appearances of the occluded ends of the tubes are explained as due to the effects of repeated attacks of inflammation, forcing the contained fimbriæ more firmly against the inner wall of the occluding membrane.

The writer draws attention to two objections which may be raised to his theory. The first, namely that repeated attacks of salpingitis are necessary for its explanation, he answers by pointing out that it is just in the chronic recurrent cases that the phenomenon is seen: while to the objection that he has taken no account of the ovarian fimbriæ, he replies that this is a very unstable organ. J. B. B.

Appendicitis and Adnexal Disease.

At the XVI. International Congress of Medicine

P. Segond (Paris), said at Budapest that the combination of appendicitis and adnexal disease, especially in their chronic stages, was common enough, and after discussing the ways in which these affections extended or communicated, passed on to the mechanical effects upon the appendix, of adhesions due to adnexal disease. He dwelt upon the difficulties of differential diagnosis, the existence of appendicitis during pregnancy, the possibility of its being confused with an extra-uterine pregnancy or with torsion of the pedicle of a tumour. Incision was of course demanded by suppuration. Cases suggesting inflammation of the cæcum, seldom justified vaginal operation; the appendix should be inspected at every laparotomy and if diseased removed, otherwise, let alone. The median incision was to be preferred in all such cases.

Fabricius discussed the same subject chiefly in regard to differential diagnosis.

J. J. M.

On the Origin of the "Services d'Accouchement" in the Hospitals of Paris.

Maygrier (*L'Obstétrique*, September 1909) relates in detail the struggle to get this service established which was referred to in the obituary notice of Dr. Bourneville [in this journal for September, page 208]. E. H. L. O.

Pregnancy in an Accessory Tube.

Graz (*Gynæcol. Rundsch.*, Jahrg. iii, Ht. 17).—The patient, in her second pregnancy, presented herself during the fourth month with a tumour situated to the right and in front of the uterus. It was situated on the left round ligament, attached to the anterior layer of the broad ligament. The Fallopian tube and ovary on the left side were normal. The sac, about the size of a man's fist, lay behind the peritoneum.

By a process of exclusion, the author believes the case to be one of pregnancy in an accessory tube. The sac wall consisted chiefly of a layer of muscle fibres. There were no decidual cells.

Reference is made to four cases in the literature. E. Scott Carmichael.

REPORTS OF SOCIETIES.

THE ROYAL SOCIETY OF MEDICINE.

Obstetrical and Gynæcological Section.

Meeting held Thursday, October 14th, 1909.

The Presidential Address was delivered by Dr. Macnaughton-Jones, on

Pain associated with Disorders of the Female Generative Organs.

Dr. Champneys proposed that the thanks of the Section be given to the President for his eloquent address, and that he be asked to allow it to be printed.

Mr. W. D. Spanton said he seconded the resolution of a vote of thanks to the President with the utmost pleasure. They had listened to a most interesting and suggestive address, the outcome of the ripe experience of Dr. Macnaughton-Jones, graced with that charm which always characterized him. Philosophers have told us there is no such thing as pain, but the President had clearly shown how pain may exist without any tangible physical change, while tissue changes of the gravest character are found where pain has never been felt. Mr. Spanton thought it well that our attention should be directed to these well-known facts in the delightful manner it had been that evening.

Dr. J. Curtis Webb, M.B., B.C., read a paper on

The Use of Indications for Electro-therapy in some Gynæcological Affections.

He remarked that in the treatment of gynæcological affections by electro-therapy different types of currents must be employed to produce different therapeutic effects. A rapidly interrupted induced current produces a sedative effect, and is useful in neuralgic conditions. A current with slow interruptions should be used to tone up relaxed muscle. When bare metallic electrodes are used, they produce their action by ionisation of the metals; local effects are produced, and the result will vary with the valency and composition of the electrodes. Thus a positive zinc electrode amalgamated with mercury has a strong antiseptic action. Metallic ions are driven in, and the acid radicles of the body fluids being attracted, exercise a cauterising and hæmostatic effect. If the electrode be negative, the basic components of the body fluid are drawn out, producing a solvent or congestive effect. When the electrodes are covered by non-metals, such as wool, there is no ionisation of metallic particles, and so no local effect is produced.

The causes of the metabolic effect brought about by interpolar action were mentioned. The author considered that treatment by static electricity is of great value in certain cases, more especially when a general rather than a local effect is desired. The methods of obtaining and controlling currents, and the various types of electrodes to be used, were next described. In inflammatory diseases of the vagina or vulva, copper or zinc ionisation, used in addition to ordinary methods of treatment, were of great value, and he described a special electrode suitable for these cases. Methods of treating amenorrhœa, scanty menstruation, and dysmenorrhœa, were also mentioned. In inflammatory affections of the uterus brilliant results may be obtained

by zinc mercury ionisation, which will probably largely take the place of curettage. Much may be done for simple inflammatory diseases of the tubes and ovaries. As a rule, in these cases a course of abdomino-vaginal applications should precede intra-uterine treatment. Brief notes were given of a series of cases exemplifying these methods of treatment.

In a discussion which followed, Mr. Spanton expressed his surprise that, in discussing the different forms of electric treatment in gynæcology, no mention had been made of the name of Dr. Apostoli, who certainly deserved credit for being one of its chief pioneers. He (Mr. Spanton) had adopted his treatment in cases of uterine myoma with hæmorrhage, with most excellent results, 20 years ago, but found the method somewhat cumbersome and difficult to carry out in hospital practice, and expensive and tedious in private patients, and these were probably the chief reasons why it has somewhat fallen into disuse.

Dr. Amand Routh said the Section was indebted to Dr. Curtis Webb for bringing before them some electro-therapeutical methods of dealing with gynæcological troubles in women who were averse to "operations," or were for some other reason unable to be dealt with in the usual way Some years ago, when he had more time, Dr. Routh adopted the methods advocated by Apostoli, and he had found real benefit from the use of the positive intra-uterine pole with a current of 60—120 milliampères in cases of uterine hæmorrhage due to "endometritis," or fibroids, or subinvolution. He felt, however, that the time, trouble and expense of the treatment was not justified by the results obtained as compared with those following ordinary methods of treatment. In severe cases of chronic subinvolution and endometritis curettement was preferable, and accomplished much more than mere removal of hypertrophic mucosa as suggested by Dr. Webb, for it led to radical changes in the fibromuscular tissues of the uterus, promoting absorption of inflammatory exudations, lessening bulk, and, generally speaking, restoring the uterus to its normal size and function. Fibroids were only symptomatically cured, and the cure was only permanent when near the menopause. He felt more inclined to believe that the treatment of fibroids by X-rays, as advocated by Albers-Schönberg would cause their atrophy and cure much more effectually than the electrical treatment, even if associated with ionisation, as carried out by Dr. Webb. The fact that Graafian follicles had been proved to disappear from rabbits' ovaries in twelve days, and that sterility had been proved to follow the use of X-rays, and that rapid shrinkage of fibroids and cessation of hæmorrhage in women had been observed by Crabbe and Caldwell, of New York, led us to hope that we were on the eve of finding some reliable method of treatment as an alternative to hysterectomy.

He believed also in the germicidal action of high frequency currents in septic pruritus pudendi, and would be glad of an opportunity of trying it by means of a glass intra-uterine electrode in a case of septic puerperal endometritis. He hoped that in time the cases which gynæcologists could safely and hopefully hand over for treatment to their colleagues in the X-ray and electrical departments of medicine would become defined, for there was abundant room for any remedies which could take the place of radical operations.

Dr. Herman Stedman said that he had selected some half-dozen cases of chronic endometritis and cervical catarrh, and had endeavoured to cure the discharge by means of ionisation with zinc and copper, but that after six treatments of 600 milliampère-minutes had only in one instance succeeded in effecting a cure. The dose used was the standard adopted on the Continent and was arrived at by using the strongest current the patient could bear and maintaining it for a sufficient time, which when multiplied in minutes by the number of milliampères resulted in a total of 600, *e.g.*, 30 m.a. for 20 min.=600 m.a.m.

Dr. F. Howard Humphris wished to bear out the remarks of Dr. Curtis Webb,

and from personal experience to testify that, as an adjunct to gynæcological treatment, electro-therapy was invaluable. He had used it himself for several years, and had found that results could be obtained from its use which he had been unable to get without it. Various ill defined pelvic pains and backaches could be relieved as surely with the Faradaic current as with a hypodermic injection of morphia, only it was not with every Faradaic coil that these results could be obtained; different lengths of wire were needed in different cases, but in most conditions, in which a sedative effect was required, a long, fine wire coil, used with a bi-polar vaginal electrode, would give relief in 15 to 20 minutes. In cases of subinvolution, in prolapse, and in all conditions in which the uterus was lacking in tone, electricity was one of the most valuable remedial measures. In these cases static electricity, the vacuum tubes applied locally, and the wave current over the lumbar region, Dr. Humphris had found to be of special benefit, pain being relieved from the first, and the pathological cause being ultimately improved or replaced by the former physiological healthy condition.

Dr. Humphris heartily concurred in the statement as to the value of the incandescent light bath, but preferred the use of the single high candle-power lamp, especially in cases of painful menstruation, and wished that time had permitted him to quote several successful cases. In cervical endometritis Dr. Humphris had been in the habit of using the uncovered copper electrode in the cervix, with the indifferent negative pole made of clay, thus by cataphoresis disinfecting the cervical canal with nascent oxy-chloride of copper. This, he explained, is the procedure of Dr. Betton Massey, under whom he had worked for a little time, and to whose teaching and book (*a*) he owed a deep debt.

In conclusion, Dr. Humphris added to the plea in the valuable paper of Dr. Curtis Webb for the more general use of electricity as a therapeutic agent in gynæcological practice, not as a universal panacea, but as a most useful addition to the usual means of resource, not necessarily as a substitute for, but as an adjunct to, the more classic forms of treatment, as a palliative in many cases of pain, and as a curative agent in those cases which are amenable to its influence.

The PRESIDENT (Dr. Macnaughton-Jones) said that years since Charles Goodell had taught him that there were things in gynæcology we had to "learn to unlearn"—practices we followed that we had to abandon others we despised which we were forced to accept. The one thing we all had to unlearn was bias and prejudice. A good deal of both had existed with regard to electrical treatment in gynæcology. This might be explained by the fact that we had hitherto been generally ignorant of the nature and structure of electricity, and how the different kinds operated in their therapeutical applications. Physicians deserving to be exact looked with suspicion on a treatment which they regarded as empirical, and the action of which they could not explain. Hence a bias and scepticism prevailed, but this should not prevent the acceptance of new facts and the adoption of more rational methods.

The late Dr. Charles Routh, almost simultaneously with Cutter, in the sixties, advocated electrical treatment; then came Tripier, and, following him, Apostoli. When the latter's methods and results were published, he (the President) had procured all his appliances, and had tried both electrocausis and the Faradaic treatment. For the latter he used different coils and the high-tension battery, with the various-sized coils recommended by Apostoli, and which had just been referred to, with the vaginal and intra-uterine bi-polar electrodes.

With regard to electrocausis he had so serious a result in one case that he abandoned it altogether. The patient was a lady who suffered from cataleptic and

(*a*) "Conservative Gynæcology and Electrical Therapeutics." By G. Betton Massey, M.D., Philadelphia.

hystero-epileptic attacks, associated with profuse hæmorrhages from a fibromatous uterus. Every practical precaution was taken in the application of the current both as to strength and antisepsis. At first she apparently did not suffer from the treatment. A skilled electrician was present at each sitting, which was given in bed; suddenly she developed symptoms of peritonitis, which proved fatal. Apostoli pointed out that this class of patient was particularly susceptible and the most riskful to treat. With regard to Faradaisation in amenorrhœa and dysmenorrhœa, he had varying results—both with the constant and Faradaic currents. In many cases, as might be expected, there was no influence on either the flow or the pain.

The present discussion had, however, rather turned on cataphoresis and ionic medication—of this he (the President) had no personal experience in gynæcological cases. There was no doubt in his mind from the reports he had read of the results in other hands, that this method of treatment might be very beneficial in certain affections of the female genitalia, but he quite agreed with Dr. Routh that there were cases in which the delay necessitated in carrying out the treatment might be disastrous to the patient. He could not agree that curetting only removed the mucous membrane. It affected intimately the underlying muscular structure and set up a new circulatory relation between the uterus and adnexa through the blood vessels and the lymphatics, having a most important effect on the latter. Of course he referred to thorough curetting and at times tamponading of the uterus, not to mere superficial and so-called scraping. The all-important point, in deciding on any form of electrical treatment, was diagnosis. Apostoli had emphatically insisted on this. In many forms of adnexal disease such treatment was not only inapplicable and useless, as, for example, in pyosalpinx, but extremely dangerous, not merely from the point of view of delay, but from the nature of the interference itself.

Case of Placental Prævia in which it was deemed advisable to perform Cæsarean Section.

Dr. Munro Kerr, of Glasgow, reported a case of Cæsarean section for placenta prævia. The patient—a lady 28 years of age—was seen with Dr. McEwan, of Helensburgh; she was one week from full term, and had been curetted by Dr. Donald, of Manchester, for fibroid tumours of the uterus. She was considerably better for this operation, and soon after became pregnant. For a few weeks before full term hæmorrhage occurred from the uterus on several occasions, and an examination under an anæsthetic revealed the presence of a centrally situated placenta prævia. The fibroid tumours, which are situated centrally over the fundus, had become considerably larger. After careful consideration of the case, Dr. Munro Kerr came to the conclusion that the best treatment would be Cæsarean section, since it held out the best prospect of saving the child's life, and of avoiding the risks to the mother so likely to accompany a case of placenta prævia. Further than this, removal of the uterus was likely to be soon required, and the chance of any further pregnancy was small. The friends having given their consent, he performed Cæsarean section, removing a centrally situated placenta prævia and delivering a living child. The uterus was then removed by supra-vaginal amputation. It contained a number of fibroids, the largest one on the anterior wall about the size of the closed fist. The patient made a good recovery except for a slight attack of pleurisy on first getting up.

Dr. Kerr had seen one other case in which similar treatment would have saved the child, and, in all probability, the mother also. It was a case of central placenta prævia in a primipara of 36 years of age with a generally contracted pelvis. Delivery was finally effected by craniotomy after version. Judiciously chosen he was convinced there was a place for Cæsarean section in certain cases of placenta prævia.

By the ordinary methods of treatment placenta prævia had a maternal mortality of 6—8 per cent. and a fœtal of 50—60 per cent. in hospital practice, and the respective mortalities were much larger in general practice. In a carefully chosen case at full term, not interfered with, and where there was every prospect of a difficult extraction if the child was delivered *per vias naturales* would Cæsarean section have a higher maternal mortality than 6—8 per cent? Certainly not.

In fact in a series of cases where these respective treatments were employed Cæsarean section would probably give a lower mortality, for he knew of nothing more likely to be followed by death or grave septic mischief than a difficult extraction with a placenta prævia. With a full-term child this operation, too, would certainly give it a much better chance of surviving.

He only claimed that in certain well-selected cases at full term Cæsarean section had a place, and was sound treatment.

Sir WILLIAM SMYLY said that in the case recorded where placenta prævia was complicated by uterine myomata, Cæsarean section followed by hysterectomy was undoubtedly the correct line of treatment, and he most cordially congratulated Dr. Munro Kerr upon its success. Both conditions called for relief, and it was better practice and involved less risk to both mother and child to treat them simultaneously. He had not himself met with a case of placenta prævia in which he thought an abdominal operation advisable.

Dr. GRIFFITH had been convinced for some years that certain cases of placenta prævia would be best treated, both in the interests of the mother and the child, by Cæsarean section. The difficulties, and therefore the dangers, of placenta prævia, were very slight when dilatation of the cervix was easy and labour pains powerful, but the difficulties increased with the difficulty of dilatation and the absence of pains, and it was in the cases where the placenta was the so-called "central," the cervix closed and tough, and considerable hæmorrhage present that the danger was great.

In January, 1905, he was called by Dr. Crabtree, F.R.C.S., of Weybridge, to a lady, 38 years of age, who had two severe hæmorrhages. The child was lying in the first position above the brim, the cervix closed and tough, the pelvis of normal size, and the vagina narrow. Both husband and wife expressed the wish that the life of the child should be saved, and readily agreed to Cæsarean section, which was at once performed. Both mother and child made an excellent recovery. The need of special care to ensure complete detachment of the placenta had impressed itself upon Dr. Griffith. He had to remove a piece of firmly adherent placenta, which he had left behind, from the lowest part of the uterine cavity, 36 hours after the operation. The child—a boy—is living and strong, and there has been no subsequent pregnancy.

Vaginal Cæsarean section, which, in his opinion, would be the operation of election in a similar severe case of accidental hæmorrhage would probably involve too severe hæmorrhage in a case where the placenta was prævia.

The PRESIDENT said that the case brought before them raised the all-important question of the justification for Cæsarean section in placenta prævia. It had quite recently given rise to one of the most important discussions at the McDowell Centennial Anniversary in America, in which their late president, Dr. Herbert Spencer, took part. The case brought forward by Dr. Munro-Kerr was obviously, from the myomatous complication, one in which the operation was indicated, as also in that mentioned by Dr. Williamson.

Such complications demanded operations. He (the President) agreed that in primipara, with a rigid and undilatable cervix or abnormally small introitus, especially

with central attachment, the step was indicated. But he thought that many advocates of Cæsarean section greatly exaggerated the dangers to the mother of this complication. Henry Fry, in the discussion referred to, instanced the reports of 161 cases distributed between six operators, and also quoted Holmes, who had collected 1,029 cases distributed between 11 surgeons, and the mortality in both instances did not exceed 3·3 per cent.

The whole question was one well worthy of a special discussion, when the vast experience gained in the British Lying-in and Maternity Institutions could be vailable, and an authoritative opinion might go forth from this Section. The well-known teachings of the Irish school, from which he himself hailed, and which for years he had followed, convinced him that only in very exceptional instances was Cæsarean section called for. As was stated by Fry, if we allow for the occurrence of placenta prævia once in a thousand pregnancies, then the demand for Cæsarean section would not exceed one in 20,000. There were many incidental points which it would be well to have debated if the subject came up for special discussion in the Section.

REVIEWS OF RECENT BOOKS.

MYOMATA OF THE UTERUS. By Howard A. Kelly, Professor of Gynæcology in the Johns Hopkins University; Gynæcologist-in-Chief to the Johns Hopkins Hospital, and Thomas S. Cullen, Associate Professor of Gynæcology, Johns Hopkins University; Associate Gynæcologist to the Johns Hopkins Hospital. Illustrated by August Horn and Hermann Becker. Philadelphia and London: W. B. Saunders Company. 1909. Pp. 723, with 388 illustrations Price 35s. net.

One glance at this sumptuous volume will be almost sufficient to convince the reader that the authors have spared themselves neither time, care, nor expense in order to make the best of their great wealth of material. They began their study of myomata of the uterus in 1894, but circumstances induced them a year later to turn their attention to uterine carcinoma. In 1900 the authors returned to their minute analysis of their clinical and surgical work relating to myomata, and did not cease their labours until the publication of this standard work. The total number of cases in their series amounts to 1,674, including many treated by the authors in private hospitals, although the majority, of course, were submitted to operation at the Johns Hopkins Hospital from the opening of that institution in 1889, down to January 1909. Hence *Myomata of the Uterus* is a standard monograph on the pathology, morbid anatomy and surgery of the disease known as uterine fibroid, that is to say, a malady where a new-growth develops, associated with symptoms of a special character, not found in relation with innocent tumours in other organs. This work is a very perfect register of the experience of two accepted authorities, and includes no second-hand matter. For the drawings were made on the spot by Mr. Horn, Mr. Becker and Mr. Max Brödel, whose merits are recognised by all readers of the works issued by the Baltimore school, whilst the pathology is the work of able experts attached to the famous Southern University. Discarded procedures and the records of current authorities elsewhere are excluded from these pages. As this book is limited to the experience of the authors, it includes hardly one single reference, and for this relief much thanks, as the sentinel says in *Hamlet*. Again, since that experience is confined to hospital work, discussion of the merits of expectant measures is entirely discarded. "With the splendid technique as now perfected, operation certainly gives the patient a much better prospect of recovery than any method of local treatment." These are the words of two operators of great skill and experience, working under the most favourable surroundings. They are not, however, apostles of radical treatment of fibroids in every case, a fact which the inexperienced enthusiast, unsupported by "splendid technic," must not overlook. "If a patient," they observe, "has a small myomatous uterus that is apparently quiescent and occasioning no discomfort, it is wise to let well enough alone. . . . . The presence of a myomatous uterus two or three times its natural size, when unaccompanied by any discomfort, is no indication for operation." But let us mark that the timid advocate of expectant treatment is reminded that "the patient should, however, be kept under observation, reporting to the physician at least four times a year." Whilst expectant treatment is thus held justifiable, half measures are severely condemned. The application of astringents is rejected as dangerous when inflamed appendages are associated with uterine fibroids, whilst when the

uterus is movable operative mortality is very low, and cure by radical methods is certain, which cannot be said of "local treatment." Electrical procedures are condemned, a case being quoted where a patient was under Apostoli's care for a considerable period. Electricity, the authors admit, without doubt had a temporary effect, but the bleeding recurred, and Apostoli finally advised hysterectomy. Professor Kelly operated, and the uterus, figured in this work, showed little sign of any alteration in the myomata which it contained, whilst the mucosa was practically normal.

The pathological department of this work is admirable, an object lesson to "practical" men who tend to underrate the scientific aspects of disease. The authors lay much stress on pathology. There is a great deal of matter, we admit, not of primary importance in treatment, including pathological conditions of high scientific interest. We will therefore pass over such matter, to which indeed we have already turned attention in our "Review of Current Literature." Our readers will be interested to hear, however, that after duly considering the work done under their eyes by able pathologists, the authors declare bluntly that "we still know practically nothing as to the origin of uterine myomata." They also state very plainly that they have never seen a true fibroma of the uterus, more or less muscle fibre being always present in a fibroid. Many will be surprised to learn that, according to the authors' statistics, heredity plays little or no part in the development of these very common tumours. They devote a long chapter to the condition of the uterine mucosa, and state that it does not as a rule show any sign of inflammation, and that when such signs are present they are the result of the irritation of a submucous myoma, or of infection through the Fallopian tube. Thus the authors cannot allow that the cause of uterine myoma is to be traced to the endometrium, and as it is with that mucous tract, so it is with the ovaries and tubes. But when we put aside all this important, though negative, pathological evidence, we must remember that the authors, through these same researches, have been able to show that diseased endometrium is a common result of the development of fibroids and may involve such important complications as retention of blood or pus in the uterine cavity. We are also reminded that although the authors can trace no essential change in the ovaries and tubes likely to be the cause of fibroid disease, inflammation of the appendages and ovarian tumours, matters of the highest clinical and surgical importance, are very frequent. The authors tabulate these complications, and describe cases of special import very minutely. They are equally careful about distinctions and details in their chapters on changes in the new growth itself, such as suppuration, calcification, "parasitism" by the atrophy of the pedicle of a subserous growth and adhesion to omentum, etc. As these records of complications and secondary developments of necessity involve frequent mention of the same case, the authors, to avoid confusion, have adopted a special system of enumeration. The number of the case is given whenever any one of its features is recorded, and on referring to a full index of these numbers the reader will find the pages on which other features of the same case are discussed, a highly convenient arrangement, especially where the relation of the clinical and surgical aspect of a case has to be taken into account.

Our space is limited, and the mention of the surgical aspect of the case reminds us that it is time for us to turn to the authors' report of their operative work. The chapter on myomectomy, the conservative operation, where the uterus is saved, will be eagerly read by experienced gynæcologists. Adorned by some masterpieces of August Horn's pictorial art, this chapter is a complete digest of the 296 abdominal myomectomies in the authors' experience. They show a very large number of complications, pathological and post-operative, and the deaths, which amount to 16, are reported in some detail "as we all learn more by our failures

than by our successes." The authors invite their readers to draw their own conclusions as to the cause of death. They have also taken care to collect after histories. Altogether myomectomy, theoretically a perfect operation, should only be undertaken by the expert, excepting where the myoma is pedunculated. Enucleation of an interstitial fibroid of any size is difficult, and the thorough closure of the big cavity left after the removal of the tumour is harder still.

Vaginal myomectomy was undertaken in 84 cases in the authors' series, whilst in several others a submucous myoma was enucleated from the uterus of a patient on whom the abdominal operation was performed at the same sitting. There were five deaths, subsequent hysterectomy was found necessary in 2 cases, fibroid recurred with suspicion of malignancy in 1, cancer of the body developed in 1, and more than half-a-dozen patients declared afterwards that they were not well, and at the same time their troubles appeared really due to the local complaint. Several died of intercurrent diseases. Lastly, 33 reported themselves as well at periods varying from a few months to fifteen years. The authors, we see, are very candid, but statistics of vaginal myomectomy are hardly reliable since in some cases a small tumour is enucleated from healthy uterine tissue in a robust patient, whilst in others the new growth is sloughy and has to be extracted from an infected uterus in a sickly subject exhausted by floodings.

The authors, as in their earlier writings, still favour supra-vaginal hysterectomy rather than panhysterectomy. Many gynæcologists, we have no doubt, will turn to the pages of *Myomata of the Uterus* mainly to find if Professors Kelly and Cullen have modified their views. They will learn that the authors, after carefully weighing the advantages and disadvantages of each operation, have adopted supra-vaginal hysterectomy as the usual procedure. "Adopted" is a word clearly meant to be of very definite signification. They maintain that supra-vaginal hysterectomy is the easier operation, especially in difficult cases, where it is almost impossible to expose the cervix and the uterine vessels, and it involves much less danger of injuring the ureters and less tendency to the production of cystitis. When a portion of the cervix is saved, the ends of the round ligaments may be inserted into it, and a good buttress for the pelvic contents is thus formed, which diminishes the tendency to prolapse of the pelvic contents. Panhysterectomy, they admit, is much safer whenever sarcomatous degeneration of the uterus is suspected or when carcinoma of the body of the uterus complicates myoma. The authors likewise agree that when the cervix is so small that no stump can be left, complete hysterectomy is not only a wise procedure, but the only operation possible, and there is also no choice when the cervix is unfolded by a large submucous cervical myoma. They also allow that it is manifestly simpler to do a complete hysterectomy when a large submucous myoma fills the vagina, distends it, and lifts up the uterus. The vagina is easily opened up in such a case. Yet taking all in all, and making due allowance for the chances of occasionally encountering sarcoma or carcinoma, Professors Kelly and Cullen remain, as before, of opinion that supra-vaginal hysterectomy is the better operation to adopt in the majority of cases. The steps of the operations are illustrated by some more fine illustrations by Mr. Horn. Indeed without pictorial art of the highest type such procedures as bisection of the uterus, which the authors admit to be an almost desperate expedient, necessary however under certain circumstances, could hardly be explained. The statistics are given in full. Hysterectomy with bisection of the uterus is classified separately. Out of the 68 cases in the authors' series 8 died, but this modification is only attempted where the removal of the fibroid uterus is very difficult. No less than 901 abdominal hysterectomies of the ordinary types were undertaken, with 50 deaths. But it is fair to add that of the 192 performed from July 1, 1906, to January 1, 1909, only 2 proved fatal. These brilliant results are due, the authors declare, in part to the fact that many patients offered themselves for

operation before the development of serious complications, but also in a large measure to the improved methods which naturally follow when many cases of the same kind are operated upon in the same clinique.

We may dwell on one of the gravest accidents liable to occur in association with hysterectomy, namely, ligature or division of a ureter. One of the best departments of the portion of this work devoted to morbid anatomy is the chapter on the ureters in cases of uterine myomata. In two of the authors' cases the ureter was accidentally cut during hysterectomy. In both, a uretero-ureteral anastomosis was effected. Although prepared by an operator of great skill and experience, one out of the two operations proved a failure and the corresponding kidney had to be removed. Fortunately the patient recovered. In six cases in the authors' series one ureter was accidentally tied, but in only one, the solitary fatal case, did the authors fail to discover the truth before the abdomen was closed. In cases of doubt Kelly strokes the peritoneum at the pelvic brim, over the site of the ureter, with a blunt forceps. This sets up vermicular contraction of the duct, which is then dissected out down to the cervix. Care is taken not to loosen it from its peritoneal covering so as to endanger its blood supply. The authors have given up catheterization of the ureters which is least practicable just where it is most desirable

The authors consider that the surgeon when performing hysterectomy for fibroids should, whenever possible, save every healthy ovary. In 125 cases, one or both ovaries were saved; in order to exclude any abnormally early appearance of the menopause the authors have included only cases in which the patients were not over forty-one years of age. These cases amount to 56, and they are tabulated; some of the after-histories are rather short, but altogether the tables are instructive. We may add that since this work was sent to the press, one of its authors, Professor Kelly, stated in an article entitled "Amputation of the Uterus in the Corpus to preserve the menstrual Function" (*Amer. Journ. Obstet.*, April, 1909), that he has recently adopted the practice of keeping, when possible, a portion of the uterine body with the cervix in women who are still menstruating, after the method of Zweifel, Spinelli and the reviewer. (A full abstract of Professor Kelly's article appeared in the JOURNAL for June, 1909, p. 410). This preservation of a piece of endometrium as well as an ovary is an extra safeguard against severe menopause symptoms.

The concluding chapters of this noble monograph include a minute clinical analysis of complications following abdominal hysterectomy for fibroids, and later effects of the removal of the uterus, as well as the statistics to which we have referred.

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